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Eighty-Fifth Annual Meeting at Rockford, May 21, 22, 23, 1935

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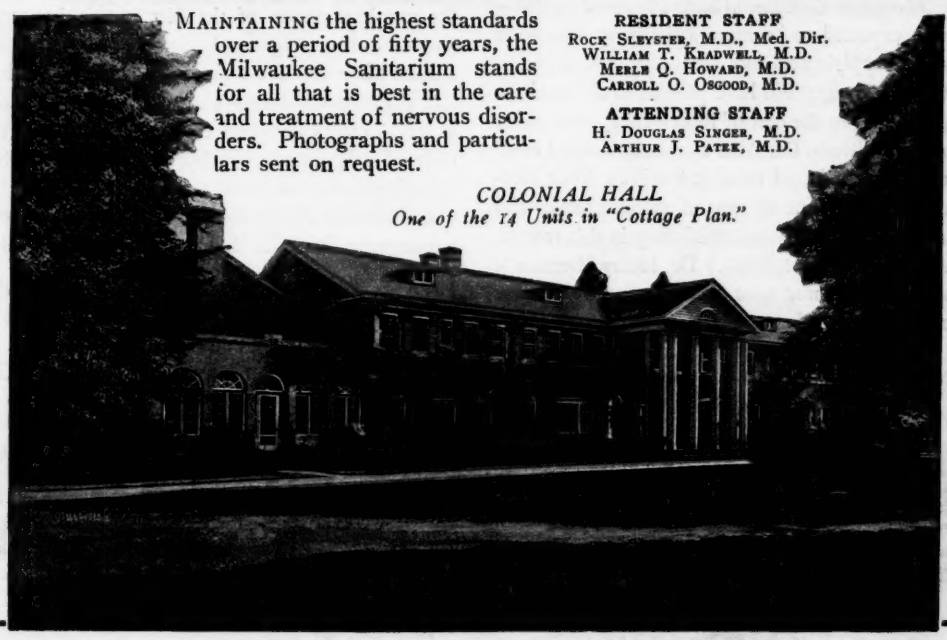

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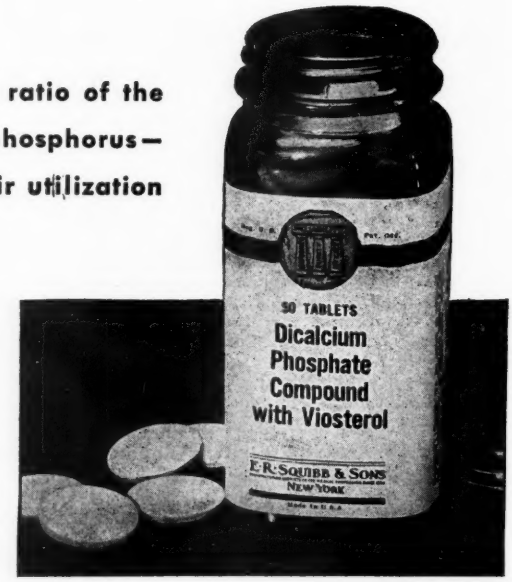

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ILLINOIS MEDICAL JOURNAL

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Editorials

HAPPY NEW YEAR!

Even in the face of the desperate economic situation confronting far too large a proportion of physicians, the year 1935 will be a period of peace, plenty and prosperity doctor, if you will take to heart the ancient Japanese proverb:

"Make your plans for the year at its beginning!"

To insure wealth and well-being these plans must include a few fundamentals, such as:

1. Determination to fight the fight of medicine through your ethical societies of organized medicine, guided by the words of the apostle, "I have fought the good fight; I have kept the faith."

2. Insistence upon knowing what your alderman, your county commissioner, your local, state and national public health services; your state and national representatives and senators; in fact, *all* your elective or appointive legislative and executive representatives are doing *for* or *against* the vital aspects of medicine.

3. Investigation and analysis, dissection and elimination of all the communistic, socialistic, bureaucratic, lay-dictated, politically-financed schemes and plots by which *Politics* seeks to make of the sacred science of medicine a catspaw to pull chestnuts out of the fire for cheap, selfish and sadly misguided personal interests.

4. Decision to tell the truth far and near—to patients, friends, acquaintances, and the public everywhere . . . as to the inadequacies and incompetencies of public health insurance, *so-called;* maternity benefits, *so-called;* and all the other sop to voters that sap the life from the taxpayers, and the soul and the functioning from medicine; and to work ceaselessly for the inherent rights of medicine and of its apostles as against the vested interests that strive to pauperize the physician rather than to endeavor to banish the entire class of paupers in so far as that can be achieved in the face of the facts of the physical and mental inequalities of individ-

uals, either congenital or acquired. Poverty, not physicians, should be their target.

5. Covenant with oneself to study personally and to digest the situation of medical economics in all its bearings from the impositions and injustices of your personal practice to the interference with the practice and future of medicine at large by endowed foundations, corporations and hospitals practicing medicine; part pay clinics; excessive costs of medical education; excessive drain of personal charity; loss of individual and constitutional rights through lay-dictated control and interference; and the general desire of the general public to further minimize the right of any practicing, legitimate physician to earn a living commensurate with the income of the average middle-class-incomed patient whom the physician serves.

Since the World War, the way of the doctor has been hard. Even the path of the recognized gangster-criminal has been far easier in more than one respect. The World War fostered in the American heart a thirst for noble experiments based upon the word "verboten." The nineteenth amendment finally *verbotened* itself off the map,—the most costly experiment in the history of the nation. Unfortunately while its departure slaked the national thirst for alcoholics, this exit did not appease, nor abate the national thirst and hunger for playing the boss and, for—further noble experiments! The softest looking back upon which to land appeared to the professional reformer and experimenter to be that of the medical profession. So now the pipers are playing a merry tune. You may not be dancing now, doctor, but you are on the way. "I told you so," is a hateful phrase.

But eventuations prophesied in these columns for almost a quarter of a century have had an unpleasant fashion of coming true. The dreaded compulsory health insurance is no longer a spectre; it is an embodied fact albeit as yet in swaddling clothes and still assailable. There can be no happiness, no non-healthy life, for medicine, nor for its apostles and disciples until all such communistic, socialistic, lay-and-politically inspired menaces are done away with. There is yet time—not much but time enough if every man in the profession will arouse to the peril.

Your "Happy New Year, Doctor," lies in the palm of your hand. With it lies the entire future of ethical medicine.

This is the Year of Crisis,—ay, it is the very month, the very week, the very day. You must awaken and bend to the task.

"Make your plans for the year at its beginning."

GOVERNMENT DICTATION OF MEDICAL PRACTICE HAS REACHED AN ALARMING STATE

The tendency of the Federal Government is to extend its powers and activities far beyond the original purposes contemplated by the framers of the constitution.

The idea of Federal domination of medical practice as well as in other matters is being generally agitated by small but active factions in our country. The movement has reached an alarming strength. The unhappy omen is, that so many Americans are utterly unaware that this movement indicates that there is to be an essential change in our form of government.

The danger which every republic should fear is overcentralization, with the subsequent substitution of domination by one man for the rule of the people. Germany was the historic symbol of absolutism. We recently concluded a war, undertaken, we are told, that democracy might not perish from the earth. If this is true, to attempt to centralize in Washington the management of affairs that rightfully belong to the respective states is to create a system which cannot but destroy democracy among our people by betrayal of principles which are the fundamentals for the maintenance of government.

The centralization of power, whether in industry, commerce, education or the trades or professions or other factors entering into affairs of our everyday life amounts to this: That if we grant to an individual the power to make standard or be the sole authority to revise, abolish or fix conditions under which the people of the future have to live, work and be educated we set up an oligarchy which will create and foster bolshevism.

Another tendency is to foist bureaucratic institutions upon the people with its added swarms of employees. Such swarms are bad enough wherever found, but in the management of government practice of medicine will be fatal to the interests of the people.

Personal freedom is in danger, and personal freedom is an essential condition for progress in society. Government ownership of anything

tends to shackle freedom. The balls and chains on the hands and feet of a convict in prison are quite bearable in comparison with the shackles which government practice of medicine would forge upon members of society.

Bureaucratic administration and government practice of medicine will mean compulsory shifting of duties proper to the individual to a subsidized governmental agency and this in the end will destroy the initiative, self-reliance and independence without which democracy generates into autocracy.

Socialistic schemes, such as health insurance, state medicine, etc., for the control of medicine would be the opening for the thousands of similar laws that would follow. In a short time after the enactment of initial ones the government would be embarking wholesale in enterprises for which no constitutional bill of rights exists, and which forthwith establishes a socialistic state. And where would it all end? We know where it ended in ruined Russia. Are we a people so favored that we can sow the wind and fail to reap the whirlwind, that we can play with pitch and elude defilement; set in motion efficient causes and escape effects; establish a system of autocracy embracing every human activity and continue to be a nation of free people—a republic—an indestructive union of indestructible states?

Parliament, it has been said, is omnipotent, but even parliament cannot create adjacent hills without intervening valleys. Can the people of America set up industrial autocracy in Washington without resulting industrial slavery? Perhaps, but only in those idyllic days when the lion and the lamb lie down together and when without restraint the festive cow (?) shall vault over the silvery moon, and everywhere by act of congress, five is the sum of two plus two.

One hundred years ago the signers of the Declaration of Independence, the framers of our National Constitution, never dreamed of the possibility of the federalization of everything in the United States. Today we are facing the federalization of medicine, Banks, Schools, Railroads and Farming and these, if enacted, will be followed by and used as justification for the federalized church or federalized method of worship and of all details of daily life.

Medical men should be wise to the situation. The current of present-day social talk is strong for federalized medicine. The movement must be headed off or directed rightly. It is part of social wisdom to erect breakwaters which will deflect erring currents into socially useful channels.

Before the movement gains further headway the medical profession as well as the public should be brought to a realization of the harmful influences resulting from the establishment of a bureaucratic form of government.

The medical profession should unitedly vigorously oppose any and every scheme brought forward which is intended to fix with practical irrevocability essential changes in the management of our every-day affairs for the good and sufficient reason that the welfare of generations of Americans yet unborn and the future efficiency of medical practice hang in the balance.

FEDERAL LICENSING OF PHYSICIANS UNNECESSARY AND UNCALLED FOR—ADDICTION IS A STRICTLY UNDERWORLD PROPOSITION AND HIGHLY COMMERCIALIZED

Excusing bureaucratic tendencies and further federal domination by accusing the medical profession of near-connivance with liberties with, if not of actual crimes against, the Harrison Narcotic Act, behold Powerful Politics in its current campaign for a federal licensing system to control the professional use by physicians of opium and coca leaves and derivatives of them, or in more common phraseology of "narcotic drugs."

The alibi for this action of the bureaucrats is the allegation that medicine did not keep its doorstep clean so it is up to politics to get out now with broom and dustpan. Nothing could be more absurd nor further from the truth. No class of the citizenry has a smaller pro rata of addicts than members of the medical profession. This has been proven time and time again. It has been demonstrated beyond cavil, that drug addicts are not made by doctors, but by the underworld, aided by negligent laws for the laity. Claims that administration of narcotic drugs during illness or convalescence have started individuals off on a life of addiction have been literally shot to pieces. The drug problem is a strictly underworld proposition and highly commercialized.

Nobody knows this better than Powerful Poli-

tics. But it is the fashion to mulct ethical medicine and make it the universal scapegoat of every possible and probable crime against the constitution. In this instance the handle of the bureaucrats is their assertion that the state medical examining and licensing boards do not exercise proper disciplinary measures against physicians who have been convicted of violating the provisions of the Harrison Narcotic Act, or of being addicts themselves or both.

Results of this contemplated federal interference need no comment. What will eventuate is obvious. That this new menace of lay control of the practice of medicine and the dispensation of drugs arises from professional handicaps is equally plain to those members of the profession who have seen, and who have protested valiantly against the laxity and incompetence of much of the legislation under which labor the state medical examining and licensing boards. There is no legislative backing when it is needed to ensure discipline. Reference is here made to those few occasions when to these bodies, evidence has been submitted showing that certain physicians, practicing under authority of licenses issued by these bodies, are themselves narcotic addicts, or have been convicted of violating the Harrison Narcotic Act, or of both offenses, and that even in the face of such misdemeanor, some such boards have found it legally impossible to either suspend or revoke the licenses of those offending physicians. Such a situation is criminal injustice to the ethical men of the profession and exposes to unwarranted attack by the laity, by the public press and by the professional reformers, every therapeutic tenet.

Men who accept a position of authoritative selective and disciplinary trust and recognize and respect and wish to fulfill its responsibilities should find the law a friend and not an obstacle. This Journal has long clamored for precision of personnel, both professional and lay, in regard to the composition of any group exercising advisory control or governing influence upon public policy of any nature and especially that public policy contacting questions of public health and of the practice of medicine and the allied arts, as well as for protective medical legislation. Experience is a sad pedogogue, and one of its saddest lessons is that what is begotten by politics and lives by politics will die by politics. Medicine should not be forced into that class by the bureaucrats. "Federal control of medicine" would seem right now to be the politicians' heaven. "Pulling a wire" is the pet pastime of the charlatan, the cultist, the quack and the criminals. Such pestilences need eradication, not nurturing.

This purposed new control system would function with a federal officer or board determining who might or who might not register under the Harrison Narcotic Act or supplementary legislation, and without such registration, no one, even a physician lawfully engaged in the practice of medicine, could administer, dispense or prescribe any drug covered by the federal licensing system.

While at the outset this prohibition might be limited to "narcotic drugs" it would place in peril the entire scheme of general therapy leaving it all practically at the nod and beck of "federal control" or at the whim of a politically controlled bureaucracy, perhaps dictated to at no very far distant time by the herbalists, napropaths, Christian Scientists or any one or dozen of the unending lists of those who make a mockery of medicine and a fat harvest field of the credulous sick.

Banished completely would be even the present far from ideal arrangement whereby a physician authorized by a state to practice medicine can register under the Harrison Narcotic act as a matter of right, and can professionally use narcotic drugs; nor can the federal government suspend or revoke his registration, so long as his *state license* to practice medicine continues in force.

If this federal licensing system is established the damage to the medical profession and to the general public will be incalculable. For as soon as the federal government begins to withhold or to cancel registration under the Harrison Narcotic Act, or any similar statute *since such denial or revocation will not coincidently estop the man or woman from practicing medicine under his state license,* there will be created automatically a class of physicians who are actively and lawfully engaged in the practice of medicine under state authority but who are forbidden by national authority to use in connection with that practice of medicine such essential narcotic drugs as opium and coca leaves, and compounds and derivatives of them! *Quod absurdum est.*

THE NEW YORK ACADEMY OF MEDICINE MATERNAL MORTALITY REPORT HAS LEFT SERIOUS ERRONEOUS IMPRESSION

The lay press of the United States should be asked to give as much publicity to the comment by Dr. E. C. Podvin upon the Report on Maternal Mortality as was given to the report itself.

Before the New York Obstetrical society, the New York Academy of Medicine and the Medical Society of the County of New York Dr. Podvin read a brief but able paper. He is an executive officer of the Bronx County Medical Society. Plenty of us would like to pat him on the back. He at least has the right idea. We quote from *The New York Physician and Private Hospital.* Said Dr. Podvin:

"I have been asked to discuss this report from the viewpoint of the general practitioner, the reason being no doubt that I spend the greater part of my time sitting at the crossroads of medical activities—in an office of organized medicine. I attend an average of fifty meetings a month—society meeting, committee meetings and the like—and I can assure you that no happening within my memory has been the occasion of so much comment, printable and otherwise, as has this report. I will endeavor to bring to you as briefly as possible some of the impressions that I have received from these discussions.

"Now to enumerate a few of the points emphasized by the critics of the report.

"After contrasting the decline of mortality in acute infectious diseases with the fatalities occurring as a result of pregnancy—an absurd comparison—the report states: 'Greater progress has been made in the understanding and treatment of the more serious abnormalties of pregnancy and delivery. These advances have failed to produce a decrease in the deaths. The conviction has been growing that this group of diseases, if subjected to intensive study and investigation, would yield the information which could be utilized to produce an improvement comparable to that of other fields of Preventive Medicine.'

"Certainly nothing adduced in the study we are considering tonight fulfills this prophecy.

"Under the caption 'Preventability of Death' is stated the 'reduction of mortality and morbidity in all branches of medical practice has been shown to lie increasingly in the field of prevention, and obstetrical practice is no exception to this general rule.'

"Using the modern classical retort, the men say, 'Oh yeah?' how about placenta previa, accidental hemorrhage and toxemia of pregnancy. Are these preventable? If so, how?

"Further in this illuminating chapter we read 'in judging whether or not the death was inevitable, the criteria has always been *that of the best possible skill,* both in diagnosis and treatment, which the community could make available.' The positive date of the arrival of this millennium whereby every delivery shall be provided with 'the best possible skill available' is still unprovided for by this report. Even the courts in judging the culpability of a doctor in a malpractice action do not require that he exercise the highest possible skill. If it is shown that he displayed ordinary ability in keeping with the average in his locality he cannot be held accountable. Yet a Committee of doctors would hold him responsible unless he exercises 'the best possible skill available.' And it is on the basis of such ridiculous hypothesis as this that the conclusions are reached.

Prental Care

"Under this heading much has been written. The blame for many fatalities absolutely fixed by this observance or otherwise. Yet the fact remains that during the period of this study the development of prenatal care has come into more general use than ever before. When I began the practice of medicine thirty-five years ago prenatal care was practically unknown. No one today would wish to deny its proper sphere in obstetrics. Yet it does not seem startling that though the great bulk of the deliveries at present are done by the more recent graduate familiar with the routine of prenatal care—whatever we know about it—there has been little if any appreciable reduction in mortality. In fact on page 143 of the report it states 'it is very difficult to offer any conclusions in regard to the influence of prenatal care upon the outcome of the case.'

Hemorrhage

"The report reads 'if a woman died from hemorrhage accidental or placenta previa—the death would be accounted as preventable *if it appeared* that there had been an improper choice of the method of delivery.' How do these super-

men determine merely from a study of the records that the choice between a podalic version and a Cesarean must have been an improper one and ergo accountable for the mortality?

Septicemia

"Just one sentence from this chapter 'When there has been any artificial interference *whatever* preceding a death from septicemia that death has usually been classified as preventable and the responsibility ascribed to the doctor.' In other words in the absence of positive proof to the contrary blame it on the doctor. No extenuating circumstances, no question of reasonable doubt. To escape he must prove an alibi. Many cases of fatal toxemia have followed spontaneous deliveries. Who is to blame for these?

Toxemia

"Again quote 'If a patient . . . showed evidence of toxemia and the doctor failed to prescribe the proper treatment the death would be counted preventable. Just what and how efficient is the so-called proper treatment in toxemia? The only routine described in this report is rest and diet. This is emphasized by frequent repetitions, yet while not decrying its advisability, how many cases of fatal toxemias have we not seen following its careful observance, too frequently in the doctor's own family. How, then, the absolute dicta that its non-observance is probably the cause of preventable deaths?

Midwives

"In this chapter the absurdities of this report rise to a climax. How the Committee can justify the recommendation of elevating the standards of obstetrical practice by better training in the Medical College on the one hand, and later advocate the extension of the practice of midwivery is beyond the ken of ordinary human intelligence. The experience of the doctors that I have listened to has been that the practice of obstetrics is only a window-dressing used to camouflage the real activities of a great majority of these women.

"Now the deductions that I have made from the many opinions I have listened to are that the profession in general does not regard this as a medical report at all.

"A scientific medical report is always brought forth with temerity, after a careful laboratory analysis and practical application submitted usually to group of specialists who are the accredited leaders of this practical field. When it is approved, it is further tested by bedside applications, and eventually, if found effective, is presented to the Medical Societies, and *then* may reach the public press. Instance the vaccine for immunization against infantile paralysis by Dr. Sydney D. Kramer. No newspaper headlines. This is more like a foundation report which is of an entirely diffent species. Its one peculiar characteristic is that it is inevitably a demonstration of the correction of judgments passed before the investigation which produced them was even begun Secondly, its findings are given first to the lay press and presented in their most sensational aspects as if they had a specific purpose against the medical profession. And finally, it is always supported by the signature of some estimable gentlemen, who are either eased into an unenviable position because the restrictions placed upon their judgment make it difficult to withhold their signatures.

"It is generally held that this report will be very detrimental to the morale of the entire profession. That it has thrown no light whatever upon the means of overcoming the greatest causes of maternal mortality—namely, hemorrhage, sepsis and toxemia, but has concerned itself in a major degree in fixing the blame in what we feel is a most unfair manner on the doctor.

"So deep is the resentment that has been engendered by reading the excerpts from the report given to the lay press that it has caused the great mass of the profession at large to lose confidence in and even question the sincerity of the motives of its purpose.

"Personally, I am aware that organized medicine which has always been sustained by its unselfish and unpaid workers, and which has at all times advanced the cause of public health betterment, as well as the best interests of the profession, has sustained a staggering blow from which only the sincerity of its motives and the idealism of its leaders will enable it to recover. But it will recover and continue its endeavors long after this report is forgotten.

"The physicians whom I have heard discuss this report have examined it in a fairminded manner and with the view to finding, if possible, something of benefit to the profession. Their conclusion is that it has no value except as an

attempt to injure the standing of the profession before the public as another step in the advancement of State medicine.

"What further means may be used to attain the end we have no way of knowing. But certainly those of us who have devoted a great part of our lives in an endeavor to build up and sustain the individual practice of medicine, will not allow this or any other occasion to pass without raising our voices in sincere protest."

RUSSIAN ECONOMICS AS VIEWED BY A CHICAGOAN—RUSSIA IS NO SNAP FOR WOMEN

Proponents of the socialism of medicine and the lay control of this learned profession, would do well to find out what actually is taking place in Russia, dispensary of state control of everything from churches to crops. Results have to be reckoned with always, and one of the oldest of adages is that which says "Fine words butter no parsnips."

In the United States, without knowing it, the average citizen comes nearer to being a king, than has ever happened anywhere on earth and even in these days of depression our poorest citizens are cared for far better than the same class in any other nation. Unfortunately there is no international yard-stick for the measurement of living standards any more than there is for maternal mortality statistics. If there were there might be a keener understanding of many economic problems.

Russia has ballyhooed at a high rate and fast tempo as to the benefits deriving from state control of medicine. A few issues ago, in the ILLINOIS MEDICAL JOURNAL were published excerpts from the diary of a reputable Russian physician and surgeon in which his record of actualities and bare facts as contrasted with soviet propaganda as to the soviet status of medicine differed as widely as the circus that came to our town in boyhood and the posters that went out ahead of the circus!

In the welter and wash of subsidized reports as to what is going on in that vast nation, it is refreshing as well as essential to grasp at any statement that is truthful and free from the deadly bloat of paid-for propaganda. Samuel E. Erickson, of Chicago, former president of the Cook County (Illinois) Real Estate board and clerk of the Superior Court, returned recently to Chicago from a two months' trip through Russia, Iceland and Finland.

Mr. Erickson declares that Russia is not only the most gruesome country on earth, but that all idealism is lost not only among men and women, but even the children. Adding that everybody in Russia has a "bread card" but that there is no bread to be secured by it, Mr. Erickson said, "Russia is assuredly no snap for women. The Russian moujik is in the army and his daughter or wife must do man's work. The Russian atmosphere smells of war; the men are training; I have seen women, uniformed in white, drilling in Moscow's Red Square. I have seen women with picks and shovels digging sewers, operating street cars, serving as railroad switch brake operators, shoveling coal, piling lumber.

"Morality is something about which soviet Russia knows virtually nothing. There is no religious ceremony for marriage. Go to a marriage bureau before breakfast for instance; tell them you wish to be married, and you are. Before lunch tell them you want a divorce and you get it. Children? If you have them, just give them to the state to which you must pay one-third, if you are working."

The Chicagoan said he saw commissars sacrilegiously poke fun at the most sacred icons, or pictures depicting Christianity.

If the common people could, Mr. Erickson insisted, they would destroy bolshevism today. Another revolution, he predicted, is imminent.

DOCTORS DESIRING TO PRESENT PAPERS AT THE 1935 ANNUAL MEETING OF THE ILLINOIS STATE MEDICAL SOCIETY

Members desiring to present papers at the 1935 Annual Meeting to be held in Rockford, on May 21, 22, 23, 1935, should write to the chairman or secretary of the section before which they desire to appear.

It is desired that all papers to be presented should be practical and not merely presented as a "hobby" of an individual physician. It is desired that a request to appear on the program before any section should be sent as early as possible to the chairman or secretary, and with the request, a synopsis of the material which the member would like to present.

We are herewith giving the name and address of the chairman and secretary of each section.

If a down state member desires to present a paper it would be preferable for him to write to the down state section officer, while the Chicago Medical Society members should write to the C. M. S. officer.

It is the desire of each section to arrange the programs well in advance of the meeting, as they will begin to arrange their respective programs soon after the first of January.

SECTION OFFICERS FOR 1935

SECTION ON MEDICINE

Don C. Sutton, Chairman, 30 N. Michigan Blvd., Chicago.

George Parker, Secretary, Peoria.

SECTION ON SURGERY

J. W. Hermetet, Chairman, Macomb.

John A. Wolfer, Secretary, 8 S. Michigan Blvd., Chicago.

SECTION ON EYE, EAR, NOSE AND THROAT

O. B. Nugent, Chairman, 231 W. Washington St., Chicago.

W. W. Gailey, Secretary, Bloomington.

SECTION ON PUBLIC HEALTH AND HYGIENE

Lloyd Arnold, Chairman, 1853 W. Polk St., Chicago.

W. M. Talbert, Secretary, Decatur.

SECTION ON RADIOLOGY

F. Flinn, Chairman, Decatur.

George M. Landau, Secretary, 660 Groveland Park, Chicago.

The Annual Secretaries Conference will be held on Tuesday, May 21, at 10:00 A. M. Any secretary having suggestions as to the character of program or the presenting of papers should get in touch with Dr. Donald W. Killinger, Secretary of the Secretaries' Conference, Joliet, Illinois, as it is the desire of the officers of the Conference to have an outstanding program which will appeal to all officials of county medical societies as well as to the membership in general.

DR. COLWELL'S DAILY LOG FOR PHYSICIANS

A daily service of genuine helpfulness to every physician and a sine qua non for a bird's eye view of a medical man's daily financial condition is presented in the "Daily Log" for physicians issued by Dr. John B. Colwell of Champaign, Ill., and published by the Colwell Publishing Company, Champaign, Illinois. Price $6.00.

This is the eighth edition of the "Daily Log." For a number of years this volume has been a first aid to every busy doctor and his pocket book. Since first put out it has been subjected to yearly revisions and annotations though the general principle remains the same. "The Log" is just what its name says it is. Here is a daily financial record that is a brief, accurate, easily kept practical accounting system with daily, monthly and yearly totals, and monthly summaries and balances of income and expenses. It is *not* a ledger. To make a complete accounting system, a ledger must be run with it as the ledger is necessary for gathering together separate items of an individual account. However, this "Daily Log" is about the best thing that a busy man can have. It is easily kept by any intelligent office assistant and shows the physician the progress of his business day by day, and at the close of the year sets forth the basic figures needed for the income tax return.

Though not a clinical record there is a "Service Rendered" column for brief annotations of clinical facts.

Revisions and additions in the '35 issue include:

1. Complete revision of the Obstetrical Record, so that it will furnish the data needed for the birth certificate. All the Obstetrical record blanks are gathered in the back of the book instead of placing one sheet at the end of each month as heretofore.

2. An entirely new form of brief notations of Surgical Operations is found among the special pages at the end of each month.

3. The dating of the Daily Page is revised so that the day of the month always appears at the upper outer corner of the page.

4. A more expensive cover, better appearing and more durable, has been provided.

Containing over four hundred pages, the ledger provides a separate page for the transactions of each day of the year with extra spaces for monthly and annual summaries, expense tables, special records, and incidental memoranda. The volume is not to be confused with the small or pocket-size dairies often furnished for physicians' records, since each page offers sufficient room for the recording of thirty-two patients per

day, tabulating the service rendered and the financial account accompanying the transaction. Where fewer patients are seen, the additional space may be readily utilized in recording prescriptions given or essentials of the physical examination. The system is built on a loose leaf plan and durably bound in fabricoid. This is the best and most compact financial record which has come to our attention.

TWO'S COMPANY, THREE'S A CROWD

"Sickness is a matter intimately personal. It is a time when sincerity of dealing cannot be compromised nor human feelings flouted.

"How disturbing, then, is the thought of having a third person or alien party exercise an influence on the relationship between the patient and his physician, the two persons who, above all others, are most vitally concerned when sickness enters the home.

"Yet this third party influence, with all its unpleasant and disturbing sequels, will inevitably be thrust upon patient and physician should some of the current new schemes of medical practice ever gain acceptance.

"Carried to their full development, such plans would mean that your family doctor would be the hireling of a commercial organization or of a department of the state, the former built up necessarily by business promotional efforts, high pressure salesmanship and price competition, the latter made compulsory by legal enactment.

"Experience has already shown that contract or insurance schemes would not be successful if they observed carefully the principles of conduct and fair competition which operate as definitely for the public good as for professional honor. In these principles financial gain is subordinated to the prime object of service to the patient and to humanity.

"Furthermore, the history of some of these ventures reveals highly deplorable tendencies. 'Scare head' advertising has appeared as a means of frightening people into subscribing for memberships. Medical service has been promised at ridiculously low and actually impossible rates. The services of hundreds of physicians have been promised to subscribing members, whereas actually but a small fraction of that number were 'signed up' and available. Patients have found that they must be served by the physician assigned to them, not by the man of their choice. And the poorer classes have paid the same price for medical service as the very wealthy.

"No, the fine, sympathetic, humanitarian service at present rendered by the family physician can never be satisfactorily replaced by a commercial organization that retails medical service for a profit, nor by the state with a mechanized or regimented medical profession. The interjection of such agencies between patient and physician is unnecessary and cannot fail to be disturbing to all parties concerned."—From Mead Johnson & Company's Announcement in Hygeia, September 1934.—Adv.

TREATMENT OF GONORRHEA IN THE FEMALE

Emily Dunning Barringer, New York (*Journal A. M. A.*, Dec. 15, 1934), states that vaccine therapy is not a specific for the cure of gonorrhea. It is, however, probably a valuable form of treatment in the acute and subacute stages of the disease. This is probably true also in chronic cases in which the main offending organism is the gonococcus. It is probably not of value in cases due to "mixed" infection. In the acute and subacute stages, vaccine therapy will probably shorten the period of hospitalization. However, the great drawback of severe reaction from this treatment, especially with large doses, is to be considered. It is questionable whether large doses are justifiable, because of these reactions. Probably vaccine therapy in smaller doses combined with indicated routine treatment would be a more desirable type of treatment. Vaccine therapy is of sufficient importance to warrant further careful study into dosage, complement fixation reaction and tests for proof of cure.

THE FREI TEST FOR LYMPHOGRANULOMA INGUINALE: RECOVERY OF ANTIGEN FROM PUSTULAR REACTION

Maurice J. Strauss and Marion E. Howard, New Haven, Conn., (*Jour A. M. A.*, Dec. 15, 1934), report experiments that they believe may shed some light on the nature of the Frei reaction. The cases used in these experiments included: a clinically typical case, strongly positive to a known Frei antigen, which furnished some of the experimental antigen used, an atypical case in which a large abscess and little periadenitis were present, a typical case presenting, in addition, a large abscess, a rectal case in which there were fistulas exuding pus, a rectal case in which there were no fistulas but a typical stricture, a clinically typical case and a severe case in which there was one particularly large abscess from which further experimental antigen was obtained. The experiments suggest that the contents of the pustule resulting from the Frei test contained an antigen identical with that of Frei. From which three possibilities suggest themselves: (1) the active principle of the antigen is present in the blood and is found in the pus as a result of this, (2) new antigen was formed just as it is in active lesions or (3) some of the antigen injected into the skin was still present and was recovered in the pus. The authors state that their results suggest that: 1. If a Frei reaction is strong enough to cause vesicle formation, the contents of this vesicle are capable of producing a reaction similar to the Frei reaction in patients with lymphogranuloma inguinale. 2. The substance causing this reaction is probably a remainder of the Frei antigen originally injected and not combined with antibodies. 3. These antibodies are not circulating antibodies but fixed antibodies.

MEDICAL ECONOMICS

The Chairman of this Committee has been visiting a few of the County Medical Societies and has been astonished at the lack of definite information as to the threatened changes in the practice of medicine (on the part of the practicing physicians). This is an indictment of both the A. M. A. and the Illinois State Medical Society, inasmuch as the chief function of both is to keep the members informed and to oppose those things which in the opinion of the officers are inimical to the medical profession. Also there has been an equally unexplainable reaction on the part of some of the members that there is no real danger and that those of us, who for the last few years have been continually talking about the dangers of State Medicine are alarmists. Surely, these men have not followed the information put out by the A. M. A. and the State Society, or are unwilling to believe what they have read. Even the monthly magazine, *Medical Economics,* which is received free every month by every physician in the United States and has been classified, by the editor of the A. M. A. as waste basket material, is putting out definite information as to what is being attempted. We need not agree with their ideas and conclusions as to the ultimate result of all these attempts, but at least we can read their statements of facts and when we see that they are identical with those published by the A. M. A., surely the doubting Thomas will be aroused to the dangers of threatened legislation.

The increased number of letters that the Chairman of this Committee is receiving from both within and without the state, show that there are many men giving deep thought to this subject and are willing to help in any way possible to combat this menace. A letter from one of the most influential and seasoned members of the State Society received this morning contains the following: "The worst feature of the whole situation to me is the indifference of our individual members. I am not hunting for a job, but I will help in any way I can." That man knows the situation and has the spirit, which will help organize medicine to meet this new danger. Another letter recently received says, "The individual members of the Illinois State Medical Society have got to be jolted into a realization of this situation. Somebody must go into each county and put the fear of God and bankruptcy into the heart of our members." Strong words, but coming from the heart of a man who knows the problems of the medical profession and is willing in spite of financial independence and advancing years to carry on the fight for the continuation of the practice of medicine as a private affair, they are very encouraging.

This Committee hopes to have a definite plan to present at the next meeting of the Council in January for educating the people of the state of Illinois, including the legislators, through the activities of the medical profession, on the subject of proposed changes in the conduct of the practice of medicine. If this plan is satisfactory and approved there will be work for all of us, bounded only by our individual ability and unselfishness. Ten thousand physicians, fully informed on this subject, so that they can answer all questions propounded, with their friends can wield an influence on the people of this state, especially the legislators, second to that of no other group. But first we must make each and every physician so acquainted on the subject and so enthusiastic about the goal that they are willing to give the necessary time to prepare to be apostles.

Any physician who desires information on this subject should write at once to the A. M. A. and receive copies of their latest brochures on the subject. There are already nine of these with more in the process of preparation. A letter to the Bureau of Medical Economics, at 535 North Dearborn Street, Chicago, will bring them. We recommend particularly "Sickness Insurance Catechism" and "Sickness Insurance and Sickness Costs."

It is the duty of every physician to keep abreast of the developments in this line and this can be best done by watching the Journal of the A. M. A. and the State Journal. Also these pamphlets above referred to contain a great amount of valuable information. We feel sure that the number of pamphlets will be increased as rapidly as the data can be obtained and prepared.

Again the Committee wishes to remind the members of the State Society that they are anxious to help them in any way possible on this subject. Letters addressed to the Chairman of the Committee will be referred to the proper individual for answering, provided an addressed stamped envelope accompanies the letter. So feel

free to write them when you have an economic problem that may be possible of solution by some member of the Society who has had prior experience in the same field.

E. S. HAMILTON, Chairman,
Committee on Medical Economics,
Illinois State Medical Society.

WE ALL KNOW! WE ALL KNOW WHAT?

We all know the cause of our economic troubles in and out of our profession, yet we ask the question. If we know the cause of our economic tangle, why don't we untangle it?

A thief knows that the law is after him long before the law knows who the thief is. Why doesn't the thief stop stealing before the law knows who he is and apprehends him? The fundamental reason is that he does not want to stop stealing.

We, as a profession, have remained in our economic troubles because we have not wanted to do the things that would correct our troubles. On the whole, we want to correct our wrongs, but as individuals we still cling to the things that pulled us into our economic muddle. I am willing and desirous that you do the right thing and I am willing to blame and censor you for not doing as you should, but I want to be left alone and be permitted to follow my selfish ways with the hope that I will not only profit from my selfish gain but that I will also be benefited by the good deeds of others. You and I are the same in these hidden or so considered hidden motives, forgetful of the fact that you and I make up the great profession of medicine which has economic toubles you and I want righted.

When you and I come to that place in our desires where we want to do what we want the other fellow to do, then we will have taken the necessary and essential step which takes us to that place in our economic domain where we want to be, provided we keep stepping in that same direction. In other words, you and I must do what we want the other fellow to do and do it first.

We need more helpers and fewer competitors. Our whole economic set-up is based on beating the other fellow to it, instead of helping him to it and as a result we've gone into a tangle and each one is afraid to let go for fear the other fellow will be on his feet and gone before we get up.

This sort of plan is considered good, sound business and I have no argument with business economics, but the practice of medicine is not a business; and if it ever becomes such, it will be a poor business for a doctor to be engaged in. The sooner medicine stops talking business and turns its attention to the practice of its art and science, the less it will have need of an economic committee.

We need to adopt a plan to help one another instead of planning how we can underbid and get the business from our fellow practitioner. We need to study for ourselves, how cheap we can treat and care for our patients instead of permitting a lay commission seasoned with a few doctors who never heard the meaning of real service, to study the cost of medical service.

It is time you and I knew how much our patients can afford to pay for our services and adjust this with our patients instead of letting a few doctors who have become wealthy off the good graces of the profession sit back in their chairs of luxury and tell us what our patients are willing to pay for our services.

Your patients and mine are willing to pay us all they can for our services and you and I know better than any one else how much they can pay.

Sound economics cannot rise above honest relationships, either in business or medicine, so let's start right and we can end right.

CHARLES S. SKAGGS, President,
Illinois State Medical Society.

THE MEDICAL PROFESSION THREATENED THROUGH PUBLIC PRESS WITH A FEDERAL LICENSING SYSTEM

Physicians throughout the country should read with care the appended letter from William C. Woodward, M.D., LL.M., director of the bureau of legal medicine and legislation of the A. M. A., in reference to the threatened federal licensing system to control the professional use by physicians of "narcotic drugs."

This is undoubtedly the last thing in the world that should be permitted to happen at the present time, both for the good of the profession and of the public.

Writes Dr. Woodward:

The Presidents,
Constituent State Medical Associations.

Dear Doctor:

The medical profession has recently been threatened through the public press with a *federal* licensing system to control the professional use by physicians of opium and coca leaves and of compounds and derivatives of them, commonly referred to in this connection as "narcotic drugs."

Now a physician authorized by a state to practice medicine can register under the Harrison Narcotic Act as a matter of right and professionally use narcotic drugs, and the Federal Government cannot suspend or revoke his registration so long as his state license to practice medicine continues in force.

Under the threatened federal licensing system, a federal officer or board would determine who may and who may not register under the Harrison Narcotic Act or under supplementary legislation, and without such registration no one, even a physician lawfully engaged in the practice of medicine, could administer, dispense, or prescribe any drug covered by the federal licensing system.

If an attempt should be made to set up a federal licensing system to control the use of narcotic drugs by physicians, it would probably be under a federal claim of authority to make regulations to carry into effect some of the various international conventions to which the United States is a party, under the provisions of Article VI, Clause 2, of the Constitution, which provides:

"This Constitution, and the laws of the United States which shall be made in pursuance thereof; *and all treaties made, or which shall be made, under the authority of the United States, shall be the supreme law of the land; and the judges in every state shall be bound thereby, any thing in the Constitution or laws of any state to the contrary notwithstanding.*"

Whether a federal licensing system to regulate the practice of medicine to the extent of controlling the use of narcotic drugs could be lawfully established under these provisions of the Constitution, in view of other provisions contained in it, it would be useless here to discuss.

The present recrudescence of the idea of a federal licensing system for the control of narcotic drugs is the result—in part, at least—of inaction by some state medical examining and licensing boards. Even when evidence has been submitted to them showing that physicians practicing under authority of licenses that they have issued are narcotic addicts, or have been convicted of violating the Harrison Narcotic Act, or both, some such boards have neither suspended nor revoked the licenses of the offending physicians. In some cases, failure to act has been due to the absence of any lawful authority for action, but that has not always been the case. In states in which there is no lawful authority for the suspension or revocation of licenses under the conditions stated, the medical examining and licensing boards have too often apparently made no effort to procure legislation to permit such action. Such conditions as these tend to promote the establishment of a federal licensing system.

It will certainly not be to the best interest of either the medical profession or the public to have the Federal Government, by withholding or cancelling registration under the Harrison Narcotic Act or under any similar statute, create a class of physicians who are actively and lawfully engaged in the practice of medicine under state authority, but who are forbidden by the Federal Government to use in connection with their practice such essential narcotic drugs as opium and coca leaves and compounds and derivatives of them. I am therefore submitting this matter to you for such action as you deem proper.

It might be well for you to learn from the medical examining and licensing board of your state what the situation is there, and particularly what action, if any, it has taken with respect to evidence that has been submitted to it, if any, by the Bureau of Narcotics, Treasury Department, to prove cases of addiction or to prove convictions under the Harrison Narcotic Law among licentiates of the board. With such knowledge you will then be in a position to take such action as may be necessary to forestall demands for the establishment of a federal licensing system.

I shall appreciate it very much if you will let me know what action you take.

Yours truly

WM. C. WOODWARD,
Director.

Copy sent to Secretaries, Chairmen of Legis-

lative Committees and members of A. M. A. House of Delegates.

WOMAN'S AUXILIARY GREETINGS

Mrs. Lucius Cole and her board extend greetings to all auxiliary members and wish for them prosperity and happiness in 1935.

SOCIAL INSURANCE UNPOPULAR IN FRANCE

We quote the following from the A.M.A. regular Paris correspondence under date of December 13, 1934:

SOCIAL INSURANCE LAW UNPOPULAR

There is much discontent in French medical circles and an active discussion is taking place as to what can be done to bring the medical profession into line with the rapid changes taking place in organized society, especially since the World War. Clinics, controlled and directed by groups of physicians, as they exist in the United States, are practically non-existent not only in France but all over Europe. A series of letters in a recent issue of one of the Paris journals reveals the opposition of those who hesitate to abandon the traditions of medicine and the fervent plea of the more progressive physicians to adapt themselves to the social evolution and establish diagnostic centers under private control. The French social insurance law is not very popular, either with those whom it protects against illness and old age or with the medical profession. It differs, however, from similar legislation in Germany in permitting the assured to choose his own physician, who must adjust his charges to a fixed government tariff. The establishment of diagnostic centers all over France by the profession is one solution of the question before the govenment steps in to organize this method of extending the benefits of modern medicine.

SURGEONS TO MEET IN JACKSONVILLE, FLORIDA

The Southeastern Surgical Congress, through its secretary, Dr. B. T. Beasley, announces the sixth annual assembly of the Congress which will be held in Jacksonville, Florida, March 11, 12 and 13, 1935. The Congress has met previously in Atlanta, Birmingham and Nashville.

The states composing the Congress are Alabama, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Virginia. A record attendance is anticipated at the Jacksonville meeting. Since March is the most desirable month to visit the land of flowers many surgeons will no doubt combine business and pleasure and attend during this season of the year.

Some of the most distinguished surgeons in the country representing the different surgical specialties have been invited to appear on the program. A partial list of those who have already accepted places is as follows: Doctors Walter C. Alvarez, Perry Bromberg, Hugh Cabot, Willis C. Campbell, George W. Crile, John F. Erdmann, Paul Flothow, Ralph Green, Arthur Hertzler, C. Jeff Miller, Alton Ochsner, J. C. Patterson, J. Knox Simpson, J. W. Snyder and W. A. Weldon. More than twenty others will be listed when the program is completed. Look for the completed program which will be mailed about February 15, 1935.

For information address Dr. B. T. Beasley, secretary-treasurer, 1019 Doctors Building, Atlanta, Ga.

SOUTHERN ILLINOIS MEDICAL SOCIETY MEETS

At the November meeting of the Southern Illinois Medical Society, which was held in Mount Vernon on the first and second, there was a splendid arrangement for the activities and entertainment for the women in attendance. During the afternoon of the first, the Mount Vernon women drove the visiting ladies in their cars to the Davidson Biscuit Company factory. This was greatly enjoyed by all visitors. Following this trip the guests were entertained at a tea in the lovely home of Mrs. W. G. Parker. After a charming program of instrumental music, Mrs. Lucius Cole, President of the Woman's Auxiliary to the Illinois State Medical Society, addressed the doctors' wives. She told of some of the issues which should be intelligently understood by them and urged the women to organize county auxiliaries if at all possible. Mrs. E. U. Burroughs of Harrisburg and Mrs. I. L. Foulon of East St. Louis, councilors of the ninth and tenth districts, respectively, spoke briefly.

Mrs. Cole later addressed the doctors and their wives at a banquet held at the Hotel Emmerson. A very interesting and humorous talk was given by Mrs. C. O. Boynton of Sparta on the subject "The Pains and Joys of a Doctor's Wife."

MRS. I. L. FOULON, East St. Louis.

TREATMENT OF GONORRHEA: BASED ON LABORATORY OBSERVATIONS DURING THE COURSE OF THE DISEASE

Russell D. Herrold, Chicago (*Journal A. M. A.*, Dec. 15, 1934), believes that one application of an antiseptic daily is sufficient to control mild infections of gonorrhea and is more safe than frequent injections. Severe infections are not suitable for local application of antiseptics, and borderline severe infections should have local treatment discontinued if clinical improvement is not prompt. Intravenous and intramuscular therapy does not produce a dominating influence on the urethral infection, and such benefits as follows its use is due to a favorable influence on the infected adnexa. The more recent gonococcus antigens should be applied conservatively until more general agreement permits a recognized standardization.

OPPORTUNIST

Plumber (arriving late): "How is it?"

Happy Husband: "Not so bad. While we were waiting for you to arrive, I taught my wife how to swim."—*Penn. Punch Bowl.*

Original Articles

PREMATURE INFANTS

A Report of Sixteen Hundred and Twenty-three Consecutive Cases

JULIUS H. HESS, M.D.

CHICAGO

In the period from 1922 to December 31, 1933, sixteen hundred and twenty-three infants were admitted to the Premature Infant Station at the Sarah Morris Hospital. During this same period, 200 premature infants previously graduated were readmitted because of acute illnesses or for surgical care. Seventy-three immature, full-term infants were also cared for. This report will deal only with prematurely-born infants received shortly after birth.

Etiologic Factors Influencing Termination of Pregnancy. The occurrence of premature birth depends on many causes, which may be divided into those resulting in the expulsion of a healthy premature infant, and those which have a damaging effect on the product of conception. In the first class may be included various injuries, falls, heavy lifting, overwork, and physical exhaustion from other causes, as well as sudden emotional disturbances. Premature rupture of the membranes, either accidental or intentional, occurring in conditions which do not affect the nutrition of the ovum, as in pelvic and spinal deformity in the mother, and placenta previa, are other causes which result in expulsion of the fetus.

The conditions within the second category react to a greater or lesser degree on the fetus, some producing only momentary weakness, as the milder acute infections, and others causing a weakened physical condition as a result of their interference with the nutrition and development of the fetus.

In the United States the care of premature infants has not received the general attention of the medical profession which it merits. Hospital facilities for the care of such infants are lacking; first, because special obstetrical hospitals in most instances decline outside cases, and second, because comparatively few general hospitals are properly organized to undertake the special care required.

In a study of premature and congenitally debilitated infants, at least two factors in the life history of the fetus must be considered:

1. The term of intrauterine life. The younger the fetus when it leaves the uterus, the greater the difficulties to be overcome in carrying out the body functions necessary to life and, therefore, the lower its vitality. Biologically, age must be reckoned from the time of conception rather than from birth.

2. The state of its functional development at birth, as evidenced by the presence or absence of inherited disease or injuries related to birth. Full consideration must be given in the case of each individual infant to the causes in the parents, and the infant as well, which might lead to premature delivery or poor physical development.

Provisions Necessary for Their Care. Every attempt should be made to prevent external trauma and to approximate intrauterine conditions. They must be protected against exposure from the moment of birth. The surrounding temperature must be relatively high with minimum fluctuation. A fairly constant relative humidity should be maintained and provision should be made for a fairly free circulation of air. They must be protected from all shocks, physical and nervous, and their food must be supplied in a form and of a quality most easily digested.

Anticipation of the Infant's Birth. Asepsia. They succumb more readily to infection and are much less resistant than are full-term infants. Infection of the respiratory passages following careless exposure of and aspiration of food are frequent complications. When indirect methods of feeding are employed, whether by dropper or gavage, careful attention to details must be employed.

The preservation of body temperature must be begun immediately after birth of the infant, on the confinement bed itself, as the extent of the initial temperature loss is of no mean consequence to a premature infant. After severing the cord, the infant should be placed in a heated basket or incubator-bed, which should be a part of the equipment of the delivery-room.

In the home, hot-water bottles, a properly pro-

Presented before Section on Pediatrics, Illinois State Medical Society, Springfield, May 15, 1934.

tected electric pad, or an improvised incubator will answer the purpose. It should be remembered that these infants are easily burned and such burns are usually fatal.

The time of *tying and section of the cord* will depend entirely on the general condition of the infant and to some extent on the obstetrician's ability to prevent undue exposure of the infant to cold. In the absence of marked asphyxia, it is well to allow the pulsation of the cord to become weakened or to disappear before ligation. This usually requires from 1 to 5 minutes, during which time the infant will receive from 30 to 60 c.c. of blood from the placenta. This blood should be conserved, when possible without risk.

The cord should not be tied too closely to the skin. Great care must be exercised in tying the cord to prevent cutting it in two with ligature, which is easily accomplished in the premature; it is always well, therefore, to leave sufficient space for a second ligature behind the first in case of an accident.

The possibility of asphyxiation of the premature infant must be borne in mind throughout the entire labor. Any accumulation of secretions or aspirated material must be removed by inbersion of the child and, if necessary, by aspiration by means of a catheter. In more extreme degrees of asphyxia, early separation of the cord may be necessary so that artificial respiration and a hot bath may be instituted.

The irritation of the catheter in the pharynx will frequently reflexly stimulate respiration. It should, however, be remembered that the use of the catheter is not without danger to the operator because of the frequency of syphilis as a cause of premature birth. It may be necessary to institute artificial respiration by regular and gentle compression of the chest. Swinging and other forceful methods of inducing artificial respiration must never be practiced.

Administration of oxygen, about 120 bubbles per minute, may be of value if administered through a catheter inserted in the nose or mouth, or a properly constructed mask. *Careless handling and traumatizing the infant or too rapid performance of artificial respiration is productive of more harm than good and must, therefore, be avoided.* There must be definite indications for all manipulations undertaken. If the infant appears to be recovering spontaneously it should be left alone.

The writer has recently designed an oxygen unit for use with the Hess heated bed. This permits of any desired oxygen-air mixtures being maintained within the bed. A two-liter-per-minute flow of oxygen can be maintained for about $1.50 for a 24-hour period. (See Figure 1.)

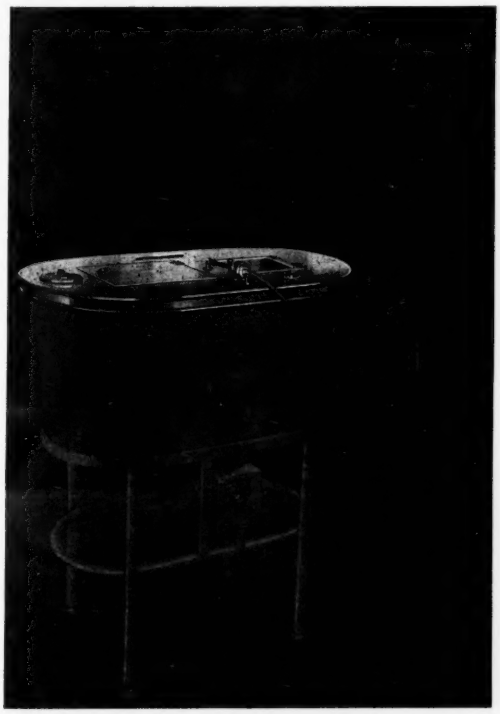

Fig. 1. Electrically heated water jacketed bed, equipped with oxygen therapy unit, for the care of premature infants. (Hess)

All premature infants, whether asphyxiated at birth or not, should be carefully watched for cyanotic attacks during the first days of life, as such attacks may develop suddenly and without warning. They may be due to a disturbance in the pulmonary circulation, congenital atelectasis, or intra-cranial hemorrhage. At other times, they are precipitated by intra-abdominal distention which may interfere with cardiac or respiratory action. Oxygen therapy offers the best single method of resuscitation.

Care of Skin and Genitalia. It is of the greatest importance that premature infants shall be handled as little as possible. Very small infants should not be bathed during the first day

or two, unless this is carried out with the special intention of resuscitation in case of atelectasis or asphyxia from other cause. It is preferable to cleanse the small infants gently with warm liquid petrolatum or olive oil. With infants weighing over 1500 grams, a warm cleansing bath may be instituted earlier. The genitalia should be carefully cleansed with sterile water without trauma. The same is true of the buttocks, after which a small pad of cotton or combination is applied to the genitalia and buttocks.

Daily Routine. The body temperature must be taken through the rectum and should be recorded morning and evening. An individual thermometer should be furnished for each infant. Undue exposure and trauma should be avoided from the moment of birth. Fluctuations in body temperature are more marked than in the full-term infant, with a tendency toward hypothermia. A minimum of 97° F. should be considered the lowest compatible with progress. Attempts should be made to limit the daily fluctuations to 1½° F. It is to be remembered that a subnormal temperature which is not incompatible with progress is common to the smaller low-weight infants. Attempts to raise the body temperature to the normal level may by overheating result in disaster through excessive loss of body fluids in the presence of a limited fluid intake.

The temperature of the heated bed should be varied with the needs of the individual infant. Small prematures and congenital weaklings with marked hypothermia should temporarily have a surrounding temperature varying from 85° to 95° F. Older and stronger infants are better placed in a bed at 75° to 80° F. As the infant develops its vital functions and the subcutaneous fat increases, the temperature of the bed should be gradually lowered to that of the nursery, which should be kept at about 75° F.

It may be necessary to place the infant in a hot bath to raise the temperature and to stimulate respiratory and cardiac function following syncope.

Removal from the bed should follow definite indications. Changing napkins, and the ordinary routine measures can be carried out in the bed.

The body must be insulated by proper clothing.

The body fluids, after the first few days, must be maintained by an intake of from one-sixth to one-eighth of the body weight in fluids in 24 hours, and this must include a caloric intake of more than a sustaining diet, 70 calories per kg. after the first few days of life.

Place of Birth of the Infants. The higher mortality of the group of infants born at home during the earlier years of the station's existence, indicates the importance of the anticipation of their requirements with the first signs of labor, with emphasis on the maintenance of a normal body temperature.

Of the first group (266 infants, from 1922 to 1926), 126 were born in hospitals, and 140 in homes. The mortality of the hospital births was forty-two per cent. and that of the homes 53.5 per cent.

Of the second group (496 infants, from 1927 to 1929), 238 were born in hospitals, and 237 in homes. The mortality of the hospital births was 25.1 per cent. and that of the homes 40.5 per cent.

Of the third group (862 infants, during 1930-1933), 352 were born in hospitals, and 510 in homes. The mortality of the hospital births was 22.5 per cent. and that of the homes 24.5 per cent.

The gradual reduction in the mortality among infants born in the home has undoubtedly resulted from the infants being received in much greater numbers during the first 24 hours after birth, and from the fact that the hospital sends for a very high percentage of the infants, bringing them to the hospital in a small hand-ambulance designed for this purpose. It is to be emphasized that approximately 80 per cent. of all our cases are cared for without cost to the parents who represent largely the poorer families in a large city.

Nursery Units for the Care of Premature Infants. In describing the hospital care of premature infants, the requirements of small special wards in a children's hospital or in the obstetrical divisions of a general hospital need to be emphasized. The lack of proper arrangements for their care in general hospitals throughout the country represents a striking lack of foresight.

The equipment to be recommended is to a large extent dependent upon the method which

is to be used for maintaining the body temperature of the individual infant.

1. Special nursery units in which ventilation, temperature, and humidity are automatically regulated.

2. Ordinary hospital nurseries in obstetrical or pediatric departments in which the external temperature is fairly constant and which are without special means of ventilation and humidity control.

In wards of the second type, individual heated beds must be supplied for the infants, and they are also necessary for a limited number of the infants cared for in wards of the first type, as it is impracticable to supply the same degree of temperature for all infants. A combination of the superheated, regulated room with special beds for the exceptional infants, represents the ideal.

It has been our desire to demonstrate that the care of premature infants can be handled in a practical manner in any well-organized, obstetrical department, or children's hospital. A station should provide at least one or more rooms and as far as possible the following equipment:

Individual heated beds for small infants; bassinets for graduates; oxygen therapy units; heated dressing table; sink with bathing slab; shelves for toilet articles; supply closet; scale; high and low temperature registering thermometer; hygrometer, wet and dry bulb; time clock, for recording time of feedings; electric heater for emergencies; screens; electric refrigerator; transportation ambulance for prematures; heated beds for home use (loaned to graduates for temporary use); ultra violet-ray lamp; electric breast pump.

Nursing Staff. The selection of a personnel for the nursing staff of a unit established for the care of premature infants requires great care. Nurses assuming these responsibilities must be intensely interested in their work. They must be willing to make many necessary sacrifices while the infant is passing through the critical stages. They must, at all times, be prepared to meet the emergencies of asphyxia and to counteract the spells of cyanosis. These two factors in themselves require almost constant diligence, otherwise the work of previous days will go unrewarded. They must use good judgment to prevent overfeeding and underfeeding, as to a very great extent the size of the individual meal will be dependent upon the physical condition of the infant at the time of feeding. In no other class of patients is it so necessary to change or modify on short notice previous orders for diet. The nurse must know the indications for and the methods of administering catheter feeding, colonic flushing, tubbing, and the application of artificial respiration.

The ideal nursing staff for such a station is, therefore, one consisting of a well-trained supervising nurse and a corps of assistants desiring this training, and who are willing to remain in this service for a long period of time. This has been made possible in our station by the endowment fund of the Infants' Aid Society which provides that the income from their fund is to be used to pay the salaries of the nurses and the wet nurses.

Service in the Home. During the infant's stay in the hospital, our nurse visits the mother, usually within the first twenty-four hours after the infant is received, and instructs her in the care and expression of her breasts so as to encourage her in maintaining the supply of breast milk. Regular four-hour expression is encouraged, the mother being supplied with sterile bottles so that she may send or bring her milk to the station. This stimulates the milk supply and encourages the mother in her effort to produce milk for the future use of the infant. As soon as the mother's physical condition permits, she is asked to come to the station at stated times to receive instruction in the care of her small infant, and to nurse it directly at the breast if its development warrants it. This is a valuable educational feature as far as the infant is concerned. When possible, the mother is encouraged to make a daily visit.

Before the infant is discharged from the station, the nurse visits the home and instructs the mother in the necessary preparation for the infant's return.

Following the discharge from the hospital, the nurse visits the home one or more times weekly, as may be indicated, until the infant's health and the weather conditions make visits to the special clinic for graduates at the Sarah Morris Hospital advisable. This applies only to those infants who do not have a private physician and

to those whose private physician desires that the infant be taken to the clinic.

Emergency Therapeutic Measures. Many infants will require shock therapy for hypothemia, dehydration, inanition, and infection.

Hypodermoclysis. Subcutaneous introduction of normal saline or Ringer's solution in amounts of 15 to 45 c.c. at regular intervals will often assist in bridging a crisis. The solutions should be administered slowly at body temperature in order to avoid further shock. *This is an emergency measure, not a routine procedure.*

Intraperitoneal administration of fluids is to be avoided, because of the dangers of intestinal perforation and interference with cardiac and respiratory functions in the small premature infant.

Oxygen Therapy. The value of the administration of oxygen in concentrations higher than that found in fresh air (20 per cent.) has long been appreciated in various respiratory and to some extent in cardiac conditions in which anoxemia was present. In the care of premature infants and the new born in the past, oxygen therapy has been more or less crudely administered because of the absence of suitable oxygen-containing chambers. For this reason, the administration has been largely carried on through the use of nasal catheters and more or less poorly adaptable masks, and, as a consequence, there was an extreme waste of oxygen, the concentration varied greatly, and much difficulty was experienced in attempts at long-continued administration. The infant oxygen unit, Figure 1, was designed to convert the Hess water-jacketed bed into an oxygen therapy chamber.

All infants weighing under 1200 grams, those showing respiratory and cardiac embarrassment, and all others whom it was believed might be benefited by oxygen therapy are placed in an oxygen chamber.

During the three years, 1931-1933, 346 of our 792 infants admitted have been placed in the oxygen chamber. Most of the infants have been kept there for more than twenty-four hours and in a few cases for as long as six weeks or more. With the exception of a few instances, the infants were kept in a 40 per cent. oxygen atmosphere (ordinary air 20 per cent.).

In the few cases where the mother had received morphine-scopolomine anesthesia, which resulted in a toxic state in the infant, carbon dioxide 5 per cent. and oxygen 95 per cent. was used.

Intramuscular and Intraperitoneal administration of Blood. In the presence of intracranial hemorrhage, melena, inanition and various infections, the muscular administration of human blood in amounts varying with the indication, at regular intervals, if necessary, offers one of the outstanding therapeutic measures in the care of premature infants. It is most useful when injected without the addition of sodium citrate. The amount to be used will vary from 4 c.c. in small infants, to 15 c.c. in larger infants. It is to be emphasizd that the injection of blood is to be repeated at intervals of from 12 to 24 hours if results are not satisfactory. Fortunately there is usually someone at hand who is willing to furnish the small amount of blood required, and its use should not be too long delayed.

Other Emergency Measures. In the presence of cyanosis, syncope, and other symptoms of cardiac and respiratory failure, one or more of the following measures may be instituted while the infant is in the oxygen chamber. Inhalation of aromatic spirits of ammonia, 1 or 2 drops of which, on cotton or gauze, are held before the nostrils; further one drop of a 1:1000% nitroglycerine solution may be placed on the tongue, or ½ mm. of 1:1000% (5 mm. of 1 to 10,000) solution of adrenalin hydrochloride, hypodermically. The use of camphor, caffein, atropin, or other respiratory stimulants hypodermically does not offer much practical help. Over-stimulation by the use of drugs is dangerous.

Cyanosis due to accumulation of mucus is best relieved by removal of the infant from the bed, holding the child in an inverted position, and, if necessary, aspirating the pharynx by the use of a medicine dropper, with its tip protected by rubber tubing. It may also be necessary to use cutaneous stimulation by friction or gentle slapping in order to reinstate breathing. The same procedure may be necessary in the presence of aspirated food during feeding or following regurgitation.

Methods of Feeding. The question of when to start regular feeding is of great importance to these infants, because of the tendency to develop acute inanition. Therefore, a regular feed-

ing regimen must be started early. Human milk is essential to a low mortality.

It is our custom to withhold water and milk for twelve hours from infants received shortly after birth, until the respiratory and circulatory functions are well established. During the second 12 hours, 2 or 3 feedings of breast milk may be given if the infant's condition warrants.

Feeding Schedule, Premature Department, Sarah Morris Hospital. First 12 hours after birth: No feeding, neither milk nor water. Second 12 hours after birth:

13th hour	Boiled water	2- 6 c.c.
16th hour	Boiled water	2- 6 c.c.
18th hour	Breast milk	2- 6 c.c.
20th hour	Boiled water	2-10 c.c.
22nd hour	Breast milk	2-10 c.c.
24th hour	Boiled water	2-10 c.c.

Infants received several days after birth, which is true of many cases, must, of necessity, be fed according to their condition when received at the station. The first few feedings should be minimum. Dehydration is often marked and demands special consideration.

Feeding from Second to Twentieth Day. For practical purposes, the second to the twentieth days may be grouped together as the second feeding period.

From the second day the infants should be fed regularly day and night, the number and time of feedings depending to a great extent on whether the food is given with or without the use of a catheter, on the gastric capacity, and on the infant's general condition. Practically all infants at first receive eight feedings daily.

Beginning (in most cases by the second day) with from 20 to 40 c.c. of human milk per kilogram of body weight, the quantity may be increased from 8 to 15 c.c. daily per kilogram until, usually by the twentieth day, feedings averaging from 80 to 140 c.c. per kilogram can be given.

During the first days, further fluids, such as boiled water or one-half strength Ringer's solution, are administered to compensate for the loss of body fluids through the kidneys, bowels, lungs, and skin. The infant requires about one-sixth of its body weight of water, inclusive of that contained in the milk, in 24 hours while in the heated bed. Such quantities, however, should not be attempted on the first days; usually it will be possible to approximate one-eighth of the body weight in total fluids by the fourth day. The early feedings must necessarily be small and the increased feedings given gradually. The infants must be considered individually, as it is impossible to formulate definite rules for feeding, at least during the first ten days.

Increases in food are based on the weight of the infant and the infant's food tolerance. The smaller and the more premature the infant, the more slowly the feedings are increased. For any premature under 1000 grams, the amount is never increased more than 1 c.c. at a time. Irrespective of the size of the premature, it is always started on a very small quantity and increased gradually, never over 3 c.c. at a feeding.

The feedings should be gradually increased until the infant is getting from 90 to 100 calories per kilogram body weight daily. This can often be accomplished by the tenth to the twentieth day.

105 c.c. (3½ ounces) of breast milk = 70 calories.
135 c.c. (4½ ounces) of breast milk = 90 calories.
150 c.c. (5 ounces) of breast milk = 100 calories.
180 c.c. (6 ounces) of breast milk = 120 calories.

Overfeeding either through too rapid administration, too large individual feedings, or too rapid increase in the day's food, should be as conscientiously avoided as underfeeding.

In some instances, it will be necessary to supplement the feedings by giving water or one-half strength Ringer's solution between feedings. In the presence of persistent vomiting, it may be necessary to resort to subcutaneous administration of fluids.

Human Milk and Lactic Acid Mixtures. To increase the protein content of the diet, skimmed lactic acid milk (buttermilk) is routinely added to the feedings of many of the infants in amounts of one part skimmed lactic acid milk and three parts breast milk. The lactic acid milk used is prepared by the addition of a lactic acid bacillus culture to sterilized skim milk. Powdered skimmed lactic acid milk can be used. It has also been found that a mixture of one part evaporated milk to three parts breast milk is well taken by older infants showing stationary weight. Whole lactic acid milk culture or powdered may later be used to replace the fat-free lactic acid milk.

The diet of the premature infant making a satisfactory gain should not be changed arbitrarily without a well-defined indication.

After the twentieth day, the food requirements of the infant are well established and a careful

observation of the weight, stools, disposition and, what is equally important, its body temperature, will decide the future food requirements. The water requirement will, to a great extent, be dependent on the supply of artificial heat and the presence of fever.

As the infant takes on weight and becomes fat, with a rounding of the features and the body, the total amount of the milk administered can be held at one-sixth and not infrequently, one-seventh of the body weight, and normal increases in weight can still be maintained.

Artificial Feeding. In the feeding of premature infants there can be no comparison between the results to be expected from human milk, or from a mixture of human and lactic acid milk, and those to be obtained with artificial food. This is especially true of infants with a weight below 1500 grams. Many varieties of artificial diet have been suggested by different clinicians, such as simple milk dilutions, cream and top-milk mixtures, skimmed milk, evaporated, condensed milk, dried milk, reconstructed milk, and buttermilk preparations. To most of these diluted mixtures, carbohydrates are added. The results with these various diets are to a great degree dependent on the physician's intimate understanding and directions for the use of the individual food.

It should be remembered that the figures quoted for the feeding on breast milk are the maximum that can be assimilated and are excessive quantities for artificial feeding in the first weeks of life. When artificially fed, these infants must at all times be closely watched for evidence of overfeeding, and the first evidence of digestive disturbances or of intercurrent infections should lead to the feeding of human milk, whenever possible.

From the foregoing statement, it is evident that smaller and slower increases in weight may be expected of the artificially fed.

The best results with artificial feeding have been obtained by the *use of small feedings of concentrated mixtures,* which precipitate with a finely divided curd. A low fat content has been found desirable in such mixtures. When fresh sweet milk is used as a basis, it should be boiled for five minutes over a direct flame. *Evaporated milk, dried sweet or lactic acid milk, or condensed milk can be used when liquid milks of good quality are not available or well taken.*

Carbohydrates are at first added in amounts of two per cent. and this is increased to five per cent. as required.

Additional Foods. To counteract the effects of boiling, the feeding of orange juice should be instituted by the third week beginning with five drops daily and increasing to one or two tablespoonfuls, twice daily, by the end of the eighth week, in larger infants. Cod-liver oil, as an antirachitic, should be fed before the end of the third week, beginning with two drops daily, and increasing to sixty drops daily by the eighth week. It is best divided in two feedings. Viosterol, or Halibut-liver oil and viosterol has been used in a considerable group of the infants, starting with 2 drops daily and increasing to 10 or 15 drops daily by the eighth week, using the preparation standardized to 250 times the vitamine D content of cod-liver oil. The infants show better progress when viosterol is used in combination with cod-liver oil or halibut-liver oil.

To meet the iron requirements of these infants, raw egg yolk, at first in small quantities, is added to the diet or both breast and artificially fed infants in the amount of one yolk to each quart of milk. One grain (0.06 Gm.) doses of carbonate of iron or iron and ammonium citrate daily may also be used to advantage. Liver in combination with iron is a good preparation. Each level teaspoon of the Lilly's formula contains approximately 3.75 Gm. (58 grains) of liver fraction, and 0.65 Gm. (10 grains) of ferrous ammonium citrate. The initial amount should be from ¼ to 1 Gm. (4 to 15 grains) daily, and increased up to 4 Gm. (1 dram) daily in older infants. Either the egg yolk or iron should be introduced into the diet by the fourth week.

As early as the third week, our infants are exposed to ultraviolet rays with the quartz lamp. The time of exposure varies with the indications in the individual case. At first these exposures should be limited to 15 seconds, and it is rarely necessary to give more than 2-minute exposures three times a week. Over-exposure may result in irritability, vomiting, and increased body temperature. The dose also varies with the amount of viosterol and cod-liver oil fed.

Infants too Weak to Nurse at the Breast. When the feedings are well taken, they can be

given without removing the infant from the heated bed. The cause of inability to nurse may be due to several factors:

Infants Unable to Swallow. This is usually because of improper development of the center in the medulla, or lack of coordination on the part of the pharyngeal muscles and tongue. This is usually made evident by the milk flowing from the dependent part of the mouth. In such cases it is generally necessary to resort to catheter feeding.

Dropper or catheter feeding is required in:

Those too weak to nurse. Those who *will not suck.* Those *vomiting after every feeding.* Those becoming *cyanotic after feeding.* In the latter cases it may even be necessary to resort to such methods as gentle friction, artificial respiration (best performed by gently compressing the thorax), warm baths, oxygen, et cetera.

Methods. One of the following methods can be selected:

1. *A Medicine Dropper.* This is possibly one of the best methods for feeding weak infants, as it is simple of application. As in all other methods, the food should be administered very slowly. Soft rubber tubing should be slipped over the end of the dropper to prevent injury.

2. *Nursing from a Bottle.* For this purpose, nipples with a small bulb are used. We have at times used the rubber bulb of a medicine dropper, if of good quality, by perforating it for nipple purposes. The bottle to be used can either be an ordinary 1 or 2 oz. medicine bottle, or better, 30 or 60 c.c. special graduated bottles which are now available for this purpose.

3. *The Break Feeder.* This was much used formerly, but has become pretty generally discarded. It had the disadvantage of a tendency to too rapid feeding if not properly controlled.

A rather slow but satisfactory method of feeding the infants is by *expressing the milk directly from the nipple into the infant's mouth* during the feeding period. This is practiced to advantage when teaching the infant to take the breast.

4. *Catheter Feeding (Gavage).* This is the simplest and best method of procedure in the smaller infants, if carefully practiced by an experienced nurse. Catheter feeding should be instituted as soon as fatigue or cyanosis is noted, following other methods of feeding. A catheter (No. 12 French, No. 8 American, No. 5 English) about 14 inches in length may be attached to the glass barrel of a small syringe. All food should be carefully measured and administered slowly with a *minimum elevation* required to obtain a free flow of the milk. The infant should be upon its back on a flat surface with the head in the median line. The passage of the catheter is usually effected without difficulty by passing it in the middle of the pharynx, gradually pushing it into the esophagus. The poorly developed reflexes rarely cause severe retching. The distance to which the catheter is to be passed is of great importance when we consider that this procedure must be repeated at least six to eight times daily over a considerable period of time. It has been our rule to measure the distance from the bridge of the nose to the tip of the ensiform cartilage, which is usually in the neighborhood of 10 to 15 cm. (Full-term newborn infants average about 16 cm.) The catheter is marked at this point with indelible ink, and a second circle is drawn 2 cm. above this point, and a third 4 cm. above the first.

The catheter is passed with the glass barrel empty in order to avoid spilling food into the pharynx and to allow of the catheter's being passed into the stomach when indicated by distention, following which the barrel is raised and the air allowed to escape. The stomach when dilated is clearly visible through the thin abdominal wall. When the catheter is passed to the first mark, the tip reaches to about 1 cm. above the cardia. When passed to the second mark, the eye will have entered the stomach, and when passed to the third mark, the tip will be well within the stomach. *It becomes evident that each infant should have its individual catheter,* as it is necessary at all times to have a fairly definite idea as to the distance it has been passed, as well as to avoid the danger of cross infection. Most of the feedings are given with the tip of the catheter in the lower end of the esophagus, thereby irritation of the gastric mucosa and stimulation of the reflex at the cardia, are avoided. A nurse soon learns the distance that the catheter should be passed under the varying conditions enumerated. The milk is now allowed to flow into the stomach, the glass barrel being raised usually from 6 to 8 inches above the level of the body. After the

feeding, the catheter is firmly compressed to avoid spilling milk into the pharynx during its removal. In the presence of gastric distention, raising the child before the feeding will often avoid the necessity of passing the catheter into the stomach, and elevating the child to the vertical position after feeding will allow of the eruction of air and frequently prevent cyanotic attacks. In elevating the child, flexion of the body must be avoided. Too rapid feeding with over-distention of the stomach, is more dangerous than too slow feeding. Usually two or three minutes is all that is required. A single nurse can carry out catheter feeding once she becomes skilled. Every nurse should be so skilled. Turning the infant on its right side following the feeding reduces the emptying time. The position of the infant should be changed at least once between feedings in order to avoid hypostatic pulmonary congestion.

The number of feedings. This will, of necessity, depend in many instances upon the question of catheter *versus* other methods of feeding. Larger infants fed by catheter can often be given sufficient food at four-hour intervals to meet their needs. In small infants, fed by dropper, bottle, or other methods, we have experienced great difficulty in administering a sufficient quantity of food by the long-interval feeding. As the attendants in charge are frequently not to be trusted with the catheter feeding, the short-interval feeding must be resorted to.

The smaller hand-fed infants are fed at two-hour intervals during the day and three hours at night. The larger are on the three-hour basis. When catheter feeding is the method of choice, even in the smaller infants six to eight is usually the maximum number needed in 24 hours. It must be remembered that all feedings are dependent on the general development of the infant in relation to its digestion and metabolism and its ability to retain the food administered, as well as on the attendant complications to feeding, such as asphyxia, cyanosis, and gastric distention.

Vomiting. Severe, persistent, may be due to intracranial hemorrhage, or systemic infection. Abdominal distention and pylorus spasm may result in repeated attacks.

Toxemia of the infant in cases of toxemia of pregnancy is common cause of vomiting. About 75 per cent. of the infants regurgitate some of their food during the first three days. Vomiting is treated by an immediate decrease in feeding. Small concentrated feedings are often better taken than diluted mixtures. While on concentrated feedings, water, or ½ strength Ringer solution should be given between feedings.

Diarrhea. In the presence of diarrhea, the infant should be starved for from 12 to 24 hours. Ringer solution, ½ strength, or weak tea is given by mouth (⅛ to 1/6 of body weight during the 24 hours). In some cases it is better to withdraw all fluids, and administer saline solution, subcutaneously, and intramuscular blood. Feedings are again started with very small amounts, 3 to 8 c.c. either with breast milk, equal parts breast milk and skimmed lactic acid milk, or whole skimmed lactic acid milk, without carbohydrates at first.

Syphilis. There were 118 (8.21%) cases of congenital syphilis among 1437 admissions.

Treatment. During the years 1922 to 1932 the treatment was as follows: Mercury inunctions, 5 grains, once daily, for seven days. Mercury with chalk, ⅛ grain daily, gradually increased to 1 grain, three times daily at the end of first year. Continuous for one year. Sulph. arsphenamine, 0.002 grams per kilogram of body weight once a week for six weeks, with six weeks of rest, three times during the first year. During 1932 and 1933 stovarsol (acetarsone) (21.1% arsenic) was the only therapy administered. Stovarsol by mouth is given in relation to the body weight of the infant. The dosage used was the following

0.005 grams per kilogram daily for first week.
0.010 grams per kilogram daily for second week.
0.015 grams per kilogram daily for third week.
0.02 grams per kilogram daily for fourth week.

And continues at this dosage for five more weeks, after which a rest period of six weeks is instituted. Three such courses are given the first year, and are continued at least one more year.

The blood Wassermann and Kahn reactions have been negative after one course of therapy in all the infants treated with stovarsol, or with mercury and stovarsol, and all have remained so.

Intracranial Hemorrhage. Intracranial hemorrhage was present in 168 (43.5%) of 386 autopsies. It is quite apparent that nature had been very kind to this group of infants. Eighty-six died on the first day, and 64 between the sec-

ond and seventh days. One hundred one weighed less than 1500 grams.

Intracranial Hemorrhage in Surviving Infants. Among 1134 infants who were graduated, 128 were considered as having had intracranial hemorrhage. Sixty-nine of these had been under close observation during the past four years and have had from 1 to 4 physical and psychometric examinations.

42 show no demonstrable physical evidence of injury to central nervous system. 11 show evidence of severe physical injury, with mental retardation in 7, and 4 showing average intelligense. 7 show evidence of moderate physical injury, with mental retardation in 4, and 3 showing average intelligence. 9 show evidence of slight physical injury, with mental retardation in 2, and 6 showing average intelligence, and 1 classified as superior.

DISCUSSION

Dr. Gerald Cline (Bloomington): I feel quite honored, but yet very timid in attempting to discuss the wonderful presentation we have listened to this morning.

As we know, Dr. Hess has had a world of experience, and does have the largest premature ward in the world. A visit to this ward at the Michael Reese Hospital is well worth your time.

One thing he has brought out to us this morning that I think is quite important, and yet something that we men in smaller communities have perhaps our biggest difficulty with, and that is a trained assistant or trained nurses. There is no question but what Dr. Hess has the best nurse at his hospital that can be obtained. She has been with him for years. We have to put up with a different nurse in most every instance, which makes an additional problem with each case.

The incubator problem, as he has shown us, is somewhat more complicated than in the larger hospitals when working with prematures in the home or in the smaller communities. The body temperature has to be maintained some way. Incubators are fine but in a home at times we have to get along with hot water bottles or even Mason jars. Electric light bulbs with reflectors in city homes and Mason jars in country homes make valuable heating units. An ordinary bathroom thermometer laid alongside the bed serves the purpose very well.

Cyanosis in these prematures, we all know, is another important factor. While Dr. Hess has oxygen and especially equipped incubators which greatly aid the cyanotic baby, I find that passing a catheter into the esophagus, letting out some of the gas, is even more of an advantage to the infant than heart stimulants that we might attempt to give, for we are not ordinarily fortunate enough to have any oxygen to help us out.

I am sure financial problems confront us all. Just yesterday I sent a premature home because the mother could not afford to stay in the hospital and also felt she could not afford to keep the baby in the hospital, so with a grandmother as a second helper I had to be content with such inexperienced help.

Another valuable hospital aid so often lacking in home and smaller community practices is a wet nurse. It is almost impossible to secure the services of a wet nurse, particularly at the time she is needed most. Naturally this necessitates getting along with modified milk formulas. Electric breast pumps are out of the question. However, the old-fashioned hand pump and especially the newer water suction pumps are quite valuable in the homes equipped with running water.

During the first three or four days after delivery, we all know, the mother has no milk, so one of my pet ideas is to use 5 per cent. glucose and 1 grain sodium citrate fed by medicine dropper in small doses frequently. Later when I am unable to get enough breast milk, I have found that Borden's Eagle Brand, sweetened, condensed milk is a very valuable complementary food. Concentrated feedings of evaporated milk also help the little youngster along when he is seemingly unable to handle very much volume.

As to etiology of the premature, it is not my experience to see as much syphilis as perhaps is seen in the larger communities. I do not know whether we are any more moral in the smaller communities or not, but the woman on the farm who works all day, tired and worn out after caring for half a dozen children and feeding her husband and three or four hired hands three times a day, is the one who usually gives us our premature babies. We do have toxemias in pregnancy but even in later years I am sure this rate has decreased because of the better education the average mother has of these matters. Multiple pregnancies, however, are quite frequent, particularly in the rural districts. We do not have the foreign population that so often contributes to the multiple pregnancies of the city.

Dr. Hess' report on 1600 prematures, of course, is far out of my list for I see ten or twelve of these little youngsters in a year. I should have more accurate statistical rates, however, but I believe after it is all said and done we men in the smaller communities can be very proud of our death rates with these prematures, especially when we consider all the difficulties we have to cope with in comparison to a practice in a large city hospital.

Again, I have enjoyed listening to Dr. Hess and always feel that he has a timely message for us.

Dr. Ray Armstrong (Champaign): I want to ask one question. Dr. Cline mentioned we have no facilities for getting breast milk. I wonder what type of feeding Dr. Hess would recommend.

Dr. Dorothy Welker (Cook County Hospital,

Chicago): Perhaps I should say regarding the premature station at Cook County Hospital, we received our inspiration from Dr. Hess' Sarah Morris station. Two years ago Dr. O'Byrne enlarged the premature station that was here at that time and since then under the direction of Dr. Blatt its capacity has been steadily increased.

As Dr. Hess has said, we now have thirty-five prematures and sometimes the census runs as high as fifty. Our monthly mortality for the last year has been fifteen to twenty-five per cent. Fifty per cent. of this mortality is classed under twenty-four hour deaths. We get most of our cases from the hospital maternity wards. We find the most frequent causes of prematurity to be maternal toxemias, multiple pregnancies and lues. About fifteen per cent. of our prematures are delivered outside the hospital.

Dr. Hess has said the most important thing in raising prematures is to supply plenty of breast milk. We get our supply from three sources: 1. wet nurses, 2. maternity wards, and 3. from mothers who bring their babies into the hospital. Every effort is made to keep these mothers lactating. Two nurses are assigned to breast expression in the maternity wards. They train the mothers and discuss the importance of breast milk with them. The mothers are urged to pump their breasts in the wards and to continue to do so when they leave the hospital. Social service workers are sent outside to stimulate the mothers to keep on with the expression of breast milk, and infant welfare aids in this work. In the Children's Hospital we have one graduate nurse on full time who interviews all the mothers bringing in infants under one year of age. If these mothers supply over eight ounces of milk a day, they have a physical examination, a Wassermann is taken, and they return each day to express their breasts, as long as their infants remain in the hospital.

Last month there were 4,197 ounces of milk collected from wet nurses, 4,235 from the maternity wards, and 1,386 from the mothers. The latter quantity helped somewhat to cut down the expense of employing wet nurses. We have a method of canning breast milk which seems to be satisfactory. The raw milk is cold packed in mason jars for one hour. We have used this product after it has been on ice for one month without producing any ill effects.

Breast milk solely is used for the first three weeks. Eight feedings of one ounce each are given to an average premature of three and a half pounds. To this, one to two ounces of skimmed lactic acid milk is added, and on the fourth week one-eighth ounce of dextromaltose. From then on the diet is gradually increased. This method was obtained from the Sarah Morris Premature Station.

We send our infants home when they weigh six pounds, because the infant welfare stations cannot follow them when they are under this weight. At the Sarah Morris Hospital, they have a more adequate system of social servicing, so that they can discharge their infants at five pounds. We hope in time to have as efficient a system of following the prematures after they leave.

The most important thing we have found in taking care of prematures, is that at the first indication of an enteric disturbance, they are starved. Even a semi-liquid stool is a danger signal in a premature, and the feedings are automatically discontinued if the semi-liquid stools continue. Eight, twelve, twenty-four, and even forty-eight hours go by without the infant being fed. Unsweetened tea by mouth and subcutaneous injections of Hartmann's solution and normal saline are used. Saline is used instead of glucose because of some opinions that glucose increases the tendency to diarrhea.

We are indebted to Dr. Hess for allowing us to use his system in these cases, and to Dr. Blatt for his sustained interest and constant encouragement in the Cook County Hospital premature station.

Dr. Hess: To a certain extent, Dr. Welker has answered Dr. Cline's question. We add some skimmed lactic acid milk to all of our breast milk by the third or fourth week, and gradually replace the skimmed lactic acid milk with whole skimmed milk.

In artificial feeding the milk of choice with me is either cultured liquid or dry lactic acid milk or chymogen milk. Others will prefer evaporated milk and some have found condensed milk valuable in their hands. Personally I have not used it to any great extent.

I just want to say one or two things more that I thought should come out in the discussion.

We do not have a lot of syphilis. When you have 118 cases out of 1,623, which is a little more than seven per cent., that is not a whole lot in a city like Chicago. It is surprising to me how few. I was under the impression, before I became interested in premature infants, that half of them would be found to be syphilitic.

My theme is that with very simple equipment any obstetrical ward can take care of small prematurely born infants.

I do not like to say that our figures are better than those in Boston, but if you read our figures published before Boston's and then those from Boston, you will see they are equally good.

It is a question of breast milk and nursing care and the points made on the nursing question are, of course, of paramount importance.

Since we have been "laying off" the ears we have not had a single mastoid. Our residents used to think every time an ear looked pink they had to stick a hole in it. As a consequence, we had bad ears, mastoids, and brain abscesses. They have almost gone out of fashion in our premature infant station.

One other thing that pertains to the spinal puncture. I have told you that 156 out of 368 autopsies showed intracranial hemorrhage. Further, 118 of our graduates were diagnosed as having intracranial hemorrhage. Dr. Glaser who made a very careful study of spinal fluids in our station found that microscopic blood was physiological in the spinal fluid

of many small infants, therefore this alone is not sufficient evidence for a diagnosis of intracranial hemorrhage.

When we do spinal punctures we do them with a 27 caliber needle, which is the smallest the nurse uses in her ward. We file off the point, making it blunt, put the infant in an upright position, and do not try to get more than just a few drops. But I do not think we are doing ten per cent. of the spinal punctures we did eight years back. As a consequence, I think some of these babies diagnosed clinically as brain hemorrhages are alive and doing well today.

So, I would say "lay off" all the operative technic on the premature and handle them with care and judgment.

THE LIGHTER VEIN IN MEDICINE

EDWIN J. KUH, M.D.

CHICAGO

This effusion in anecdotal (I hope no punster will term it anecdotage) form is based entirely on personal experiences culled from autobiographic notes, which may or may not see the light of day in their completeness. Hence the predominance of the first personal pronoun, which under the circumstances is irrepressible and for which the guilty author asks indulgence.

After twelve years of study abroad I committed the faux pas (!) in 1882 of settling in Chicago (colloquially known as a hick town) instead of in my home town, New York. The reasons were twofold: there was a tempting prospect for a rapidly successful career in general practice (in which I was not disappointed) and secondly musical programs forwarded to me contained the information that Theodore Thomas included Wagner compositions in his concerts. After 1876, in my youth, I had accumulated the piano scores of the Nibelungen and studied them assiduously. We lived in Bayreuth at the time, where I attended the Gymnasium. Anton Seidl was my instructor in music and during my lessons at his home there would frequently be a rap at the door and Richard Wagner entered to confer with him.

A kindly providence has endowed me with a dual nature: an equal devotion to the sciences and the arts, so that I am never lonesome when alone. Familiarity with six languages has contributed an additional thrill in the perusal of classics in the original.

Shortly after my arrival in Chicago the professor of physiology at one of the colleges retired and recommended me as his successor. I introduced myself to the dean of the faculty, who inquired into my antecedents. When I stated that I was a graduate of Heidelberg, he shook his head and said, "Nothing doing. Heidelberg is known as a hot-bed of free-thinking (!) and our college is a Methodist institution." I promptly bowed myself out, smiling outwardly and cursing inwardly.

The science and art of medicine have been sacred to me from childhood. Dr. A. Jacobi, "the Nestor of American Pediatrics," our family physician in New York, instilled the love and reverence for my profession into my soul from my earliest boyhood. He called me his bookworm. My profession is to me a vocation. It embodies knowledge, intense application, beneficence in the relief of suffering, honesty of purpose and recognition of one's own limitations. A retired physician once reproached me for my "unscrupulous honesty."

Fortunately not all of medical life is serious, which consideration leads me into "The Lighter Vein."

One late afternoon when I was relaxing on my office couch after a day's heavy work, there was a knock on the door and a man walked in trembling violently. "I am on the verge of delirium tremens," he mumbled, "won't you give me the price of a night's lodging?" As I handed him a coin, I asked why he didn't stop drinking. The question was silly, but it appealed to him. His answer was: "Well, you see, Doc, I am so good-natured that I can't refuse myself anything."

A driver of a brewery wagon was an excessive beer drinker and suffered from gastric irritation. He was advised to practise abstinence and promised to do so. When he returned with disappointment written on his face, he was asked whether he had followed directions. "Practically," he answered, "I cut it down to twenty glasses a day."

A patient who absented himself for several months was met on the street. "You look fine," I suggested. "Yes," he answered, "ever since I quit treating with you I gained fifteen pounds." This was said solemnly and not really intended as a dig.

In taking the history of an asthmatic woman I asked whether she raised much phlegm from

the chest. Pointing to her throat, she answered in her Yiddish jargon: "No, all my mucus comes from de troit."

Another asthmatic casually stated that he could stand the humidity all right, but that it was the dampness that killed him.

One afternoon a breathless female, primped from crown to toe, sailed into the office. "My name is Daisy Dandruff (the name is fictitious). I am a massoor, may I leave you my card?" I ventured to suggest that massoor was the male of the species, and was in reality a masseur and that she was a masseuse. I added that people were travelling abroad considerably, were picking up snatches of foreign languages, and that the better class might resent her mispronunciation. She darted a glance of dislike in my direction. The conversation then drifted into other channels. As she arose to depart she held out her hand in conciliation and said: "Thank you for the correction, doctor, and if you ever need a massoor don't forget to call me."

A boy with a stubborn throat trouble made frequent calls at my office for treatment. "You are using so much of my medicine," I twitted, "that it keeps me poor." "Us too," he countered.

Following a stroke of paralysis, a patient developed rare brain symptoms. A consultation was held with one of our prominent neurologists, from whom I expected to get quite a store of subtle information on cerebral malfunction. "Show me your tongue," he said to the woman. "Not coa-ted, but slimy," he drawled. And that was all I could get out of him.

True emergencies are always willingly responded to by me at any hour, but when a woman under a strict dietary regime called me out at 2 A. M. because of distress following the eating of raw carrots at midnight, I resented the disturbance of my rest. "You didn't tell me not to eat raw carrots at midnight," was her defense. To a certain extent she was right. I had also failed to warn her against munching cobble stones before breakfast.

Under the stress of severe activity a doctor is occasionally too critical: a woman before leaving my office habitually lingered before the wall mirror admiring herself and delaying waiting patients. I suggested that I could remove the looking glass if it annoyed her. She evidently didn't appreciate the Christian spirit concealed in my proposal and went elsewhere for advice.

A German laborer once left a summons in writing for me to call at his house. He worded it thus:

Johann Schmidt
50 . . Justine St.
obstes

The last word has been a puzzler to people not familiar with the German pronunciation of English. In order to relieve further suspense on their part, I shall solve the riddle by explaining that he meant upstairs.

My two sons held my profession in great reverence. During office hours at home they would loiter close to the door of the consulting room in the hope of getting a thrill. Both wanted to be doctors, but circumstances changed their careers. My younger son on one occasion submitted to a throat treatment. He then looked at me expectantly and asked: "Papa, am I feeling better?" This same boy once expressed his interpretation of a physician's activities by making the statement that Papa went out to make patients.

One hot summer night (Chicago, "the ideal summer resort," has plenty of them), I was called hurriedly and found the dropsical patient gasping for breath and densely surrounded by sympathetic relatives and neighbors, whose crowding added to her distress. I was not in the best of humor, and with a commanding gesture said: "Everybody get out of here." Leading the procession of departing sympathizers was an old Israelite with a long pointed beard, who seemed frightened at my exhibition of temper and ran away hastily with head thrown back and beard pointing vertically upward. He was a comical sight even under those trying circumstances. The next day I inquired who the fugitive was. "That was the other doctor," they told me. I looked him up, of course, and made the proper explanations.

Two Hungarian physicians in this city were unfriendly rivals. A patient of one of them insisted on having the other in consultation. The consultant strained hard to make an impression on the family by spouting his learning. The attending man resented his loquacity by pointing an accusing finger at him and saying: "Sie schmusen mir zu viel" (You are jabbering too much to suit me).

We have a surgeon in Chicago whose awkwardness and untidiness in his work have always made me wonder how anybody could employ him. One of his patients afflicted with a stricture of the urethra came to me for treatment with this raw story: Dr. X., after sterilizing a metal sound in boiling water, forgot to cool the instrument before introducing it. His victim jumped off the table with a howl of agony. The doctor, with rare presence of mind, tried to calm him by promising not to charge him for that treatment.

What I confess to be a mean trick on my part is to say with a gloomy voice to patients with a sense of humor, that I had bad luck in my practice lately, and then hasten to relieve their anxiety by stating that I had had so many sudden recoveries.

My interest in the esthetic once culminated in an embarrassment. The living room of a house where I called professionally was furnished in exceptionally good taste and on the walls hung genuine works of art. I didn't realize how much absorbed I was in their contemplation, until a member of the family interrupted me and asked, "Doctor, won't you also take a look at the patient?"

My first obstetrical case was a thriller. The prospective young parents were referred to me by Dr. Arpad Gerster of New York. They lived many miles from my residence on the west side of the city. It was the most protracted labor I ever witnessed. The sympathetic husband sat at the bedside straining with the parturient wife, as though he himself were getting the baby. At last the infant arrived, but the labor pains continued unabated. Upon investigation I found that there was a twin, requiring a podalic version. I was so exhausted by the all-night vigil that I called in a specialist. He extracted the second child and in so doing fractured one of her clavicles. But everything came out all right in the end: mother, babies and I made an uneventful recovery. The name of my consultant was Merriman, thereby adding insult to injury.

A woman who came to me for hay fever and asthma treatment behaved so awkwardly that I lost my temper, and we agreed to disagree. Early one Sunday morning a year or two after, I was summoned to the telephone to make an appointment with a new patient. After her arrival I recognized in her the old sinner. She had come under an assumed name, but saw that I recognized her. The embarrassment written over her deceptive features was so comical that I burst into laughter. We kissed (this is not to be taken literally) and made up, and from that time on there was complete harmony between us. She yielded to my disciplinary guidance and is now in perfect health.

One of my most conscientious patients occasionally appeared after a prolonged absence with a look of depression on his face. "Doctor," he would say, "I owe you an apology. I have been so well all these months that I could find no excuse for consulting you. But as long as I'm here you might as well look me over." He has a son who is also afflicted with chronic good health and who always seems happy to discover a slight blemish, from a pimple up, with which to present himself.

By way of contrast, I shall now describe one of the most pathetic experiences of my career. At the request of an intelligent druggist whose asthmatic wife I had relieved permanently of her intense suffering, a woman had me called to her bedside. She was emaciated (weighing eighty odd pounds) and under the care of a nurse. There was the question of a complication with tuberculosis. Laboratory tests excluded that and other diseases. We then agreed that she was to be brought into my office for an initial trial of my method. To my surprise several appointments were broken. At last the nurse appeared with this explanation:

"Doctor," she said, "I have a confession to make. Mrs. S. was so impressed by your examination and general demeanor of expertness, that she was afraid you might be successful with her. She is a confirmed morphinist and feared that you might withdraw the solace of hypodermics. She prefers her asthma plus morphine to health without the narcotic."

"If you wish to grasp infinity, study human stupidity" is a statement credited to Renan. In visiting a patient I found that he had a febrile disease and instructed his wife to keep a record of his temperature. She invariably found it normal. I asked her to take it in my presence and found that she inserted the wrong end of the thermometer into his mouth.

When typhoid fever was a prevalent disease the nurse was found to have omitted a record of the

patient's temperature from one day to the next. When asked the reason, she said: "The patient's temperature went so high last night that it busted the thermometer."

A woman once asked whether doctors charged reduced rates for children.

Men who claim that they don't know how to take an enema are invariably bachelors of a shy disposition.

But even physicians can be maladroit. The following incident will serve as an illustration. A new patient came to consult a doctor. After taking her name, address and telephone number, he asked: "Married or single?"

"Married," was the answer.

Doctor: "Any children?"

Answer: "No."

Doctor: "How long married?"

Answer: "Three months."

A psychologist may be able to understand better than I why women prominent in public life and impressed with their importance, resent the taking of a thorough history of their case. They seem to interpret it as a prying into their intimate lives, and make it a practice to dodge my purely professional questions.

We have in Chicago a specialist who is famous for his skill and notorious for his bluntness. A woman who had risen through marriage from a lowly rank into affluence, laziness and adiposity, went to consult him, because he is the fashion. After looking her over carefully, he summed up his diagnosis in these words: "The trouble with you is that you are too damned fat." She left him in high dudgeon and drifted to me, relating her experience. That put me on my guard, of course, I agreed with the other doctor, but expressed myself more delicately by saying: "Madame, you are over-weight and must take exercise and go on a diet." She thanked me for my courtesy and went about town proclaiming me a perfect gentleman.

Not so long ago I was denounced by an occasional patient as an old fogy, because I don't prescribe sauerkraut juice.

At the time that Sinclair Lewis was planning "Arrowsmith" we happened to meet socially, and unconventionally, not to say rudely, isolated ourselves in a corner of the room away from other guests. He "pumped" me for possible contributory medical factors. In the course of our conversation, I congratulated him on his deep insight into the soul of the physician as manifested in Main Street. No writers of fiction, I remarked, except George Eliot, could rival him in that regard. I could read in his face that the comparison with a mid-Victorian did not strike him as complimentary. "You have made yourself guilty of only one slip," I continued. "According to your graphic description of Bea's death, she died of a typhoid perforation and Kennicott should have performed a laparotomy as a last resort." "Did she really die of a perforation?" he asked in some bewilderment. "I didn't know it."

One more experience, which is too amusing for omission: When paraldehyde was a novelty as a hypnotic, Dr. Martin Matter and I walked into a drug store employing a German clerk and asked in his native language for Paraldehyde (pronounce the last syllable "hüd"). He told us to drop in the next day and he would take care of our order. When we arrived he handed us a couple of old hats: e' Paar alte Hüt'.

30 N. Michigan Ave.

CYSTIC DISEASE OF THE LUNGS

(With Report of Eight Cases)

EMMET F. PEARSON, M. D.

SPRINGFIELD, ILL.

Cystic disease of the lung has aroused considerable interest during the past decade. This interest has come in the wake of modern diagnostic methods and more bold surgical approach to intrathoracic pathology. The clinician must now be constantly on guard in order to recognize cysts and other non-tuberculous diseases of the lungs, which frequently lend themselves to effective therapeutic methods.

Non-parasitic cystic disease of the lungs with which we are here concerned includes localized distentions of portions of the tracheobronchial tree, the cyst wall usually retaining the histologic characteristics of the portion from which it developed, and other discrete sacs, which are thought to originate from the interstitial tissue of the lung. Cystic disease in its broadest meaning includes the rare dermoid cysts which develop from aberrant rests of primitive tissue and

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parasitic cysts such as the hydatid cysts which develop from the ovum of the dog tapeworm, *Taenia echinococcus*. The parasitic cysts are seldom seen in this country, but are frequently reported in countries where the dog is used in herding animals, as in Iceland, Australia and the Argentine.

True lung cysts vary greatly anatomically and in the clinical syndrome produced. The most characteristic histologic feature of the majority of cysts is that they are lined with epithelium, which may or may not be ciliated, and the wall may contain cartilage, mucous glands, muscle and elastic tissue. The walls of a few cysts, which do not contain any of the above histologic features, are thought to originate from faulty lymph anlage and, therefore, are lymphangiectatic spaces. The cyst wall may be thin and elastic, allowing rapid distension with air and producing "balloon cysts" which are seen only in infants. Other solitary cysts or clusters of cysts have more or less rigid walls which do not permit changes in size. These occur in any part of the lung and may or may not communicate with bronchi. They may contain gas or fluid which becomes purulent when they are infected. Multiple cystic dilatations in one or several lobes of the lungs produce a condition which simulates acquired bronchiectasis. The German literature contains several case reports of diffuse cystic change throughout the lung, a condition called "honeycomb lung."

Cystic disease has been extensively studied pathologically. Müller[1] in an admirable review of the pathologic studies concluded that a sharp distinction between congenital bronchiectasis, lung cysts, "honeycomb lung," small cystic degeneration of the lung, congenital vesicular changes, fetal atelectasis, bronchial and lung adenoma, and congenital pulmonary lymphangiectasis is not possible.

Various theories[2,3,4,5] regarding the etiology of cysts have been advanced, but probably no theory explains all the cases. The majority of cysts are undoubtedly congenital in origin, but some develop after birth in defective areas of the lung or after some obstruction causes a distention of a portion of the bronchial tree distal to the obstruction. The clinical significance of a cyst once formed does not depend on its method of formation.

Meyer,[6] in Germany, published the first report of a case of lung cyst in 1858. Koontz[7] reviewed the literature in 1925 and found 108 cases of so-called congenital cystic disease. I have found and read in the available literature the reports of 64 cases since that time, 20 of which have been reported by American authors. I have made a resumé of these cases and will use them to demonstrate various features of the disease along with the discussion of the cases which I am to report. The list of 172 cases that have been reported as cystic disease could be increased by including cases reported as bronchiectasis, localized emphysema and pneumothorax which, from description, are identical with other cases reported as cysts.

While serving as interne at the Barnes Hospital and during my service as Resident on the Medical and Surgical Chest Service of that hospital it was my good fortune to observe with Drs. E. A. Graham and J. J. Singer eight cases which may be classified as having true cystic disease. These patients have shown many of the bizarre clinical effects that may result from cystic disease and certain unique features of diagnosis and treatment were employed.

Case 1. *Rupture of a Baloon Cyst with Spontaneous Pneumathorax in an Infant.* (See Fig. 1.)

N. D. Male infant, age eighteen months when seen in the Chest Service in August, 1931. The child was normal at birth and developed normally during the first year. Fourteen weeks before admission the child began having some difficulty in breathing and there was an audible wheeze; this was thought to be asthma. He continued to have recurrent attacks of extreme dyspnea and cyanosis during the next few weeks. At the time of admission to the chest service the dyspnea was continuous. The physical signs revealed the heart displaced into the right side of the chest compressing the right lung. The left side of the chest was expanded, percussion over this side produced a hyperresonant note and breath sounds were absent. X-ray and fluoroscopic examinations revealed huge cystic areas almost filling the left side of the chest and a pneumothorax pocket above the left leaf of the diaphragm. A needle was inserted through the chest wall into one of the cysts and nine hundred cubic centimeters of air were aspirated. Prompt and dramatic relief of the patient from the dyspnea and distress resulted from the aspiration. Lipiodol was injected through the needle directly into the lumen of the cyst. The accompanying film was taken after the lipiodol had been injected and the child was rolled over a few times in order to spread a coating of the iodized oil throughout the cysts. The child was lying on his right side when the film was taken. It was not possible to ascertain whether the cystic areas on

the right side originated on that side or herniated through the mediastinum. Frequent, usually daily, aspirations of air were continued as symptoms demanded during the following four weeks. Some serous fluid accumulated and after this was aspirated the attacks of dyspnea subsided, the mediastinum returned to the midline and the cysts gradually decreased in size until no signs of them could be detected. A recent x-ray film reveals nothing that could be called abnormal. It is our opinion that after the development of the serous fluid the pleura became adherent to the chest wall which prevented repeated development of spontaneous pneumothorax and a fibrosing process caused occlusion of the orifice through which the cysts communicated with a bronchus. The air in the cysts then was absorbed and the cysts obliterated.

Case 2. *Rupture of Cyst Causing Pneumothorax in an Infant with Sarcoma of the Lung.* (See Fig. 2.)

S. F. A twenty-eight months old girl, when first admitted to the St. Louis Children's Hospital in January, 1933. She had a cough, slight fever and dyspnea, which was out of proportion to the rest of the clinical picture. There was notable retraction of the costal margins on inspiration. Physical examination of the chest revealed nothing pathological, except suppression of the breath sounds over the mid portion of the right lung posteriorly. An x-ray film taken at that time showed some general haziness of both lung fields and an opacity below and lateral to the right hilus region. She recovered quite completely from this respiratory infection, which was called influenza, but soon began having a slight non-productive cough. In the two weeks preceding her second admission, which was May 24, 1933, she had been dyspneic but not cyanotic. The dyspnea was not paroxysmal. On admission, she was afebrile but had some cough and there was a mild rhinopharyngitis. There was notable fullness of the right hemithorax and the percussion note was hyperresonant over this side. The heart and mediastinum were displaced into the left side. Breath sounds were absent throughout the right chest, except over an area near the sternum anteriorly where there was amphoric breathing. An x-ray film showed a huge pneumothorax pocket compressing the right lung and crowding the heart into the left chest. Above the inner third of the right leaf of the diaphragm, there were several rounded rarefied areas surrounded by zones of increased density and averaging two centimeters in diameter. The lowest space contained a fluid level. Lipiodol introduced through a needle which was inserted through the space between the cricoid and thyroid cartilages failed to enter any of the cyst-like areas. A needle inserted into the right pleural space showed the pressure to be positive six centimeters of water. Air seemed to refill the pleural space as fast as it was withdrawn. Tuberculin test was negative and other routine laboratory tests were also negative.

The patient gradually became worse during the next months and died in September, 1933, nine months after she was first seen. During the intervening months, a mass had grown to fill the right side of the chest. At necropsy this mass was found to be a huge sarcomatous tumor. The probable course of events was that a slow growing sarcomatous tumor largely occluded a small bronchus; small cysts were formed behind the obstruction; further distention of one of the cysts caused it to rupture and a pneumothorax was produced. The tumor grew to fill the entire right hemithorax, compressing the lung tissue and the cysts beyond recognition.

Case 3. *Cysts in an Infant with Complicating Pulmonary Infections.* (See Fig. 3.)

J. H. A one year old male infant, who was perfectly well until he suffered an attack of bronchopneumonia five months before admission. He continued to

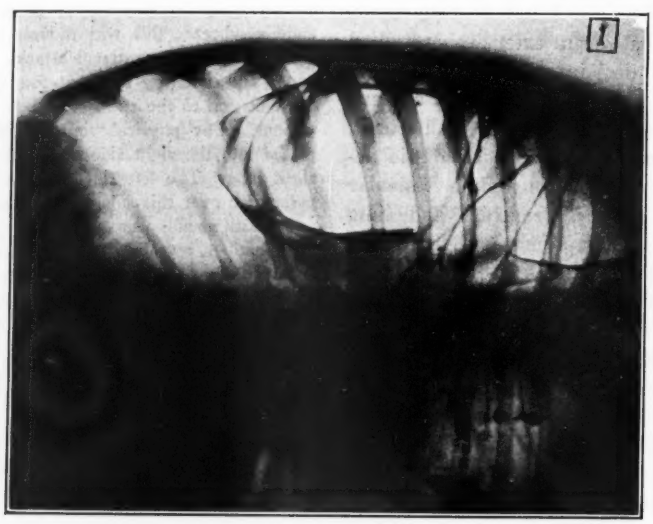

Fig. 1. "Balloon cyst" in an infant, age 18 months. The wall of the cyst has been outlined with lipiodol.

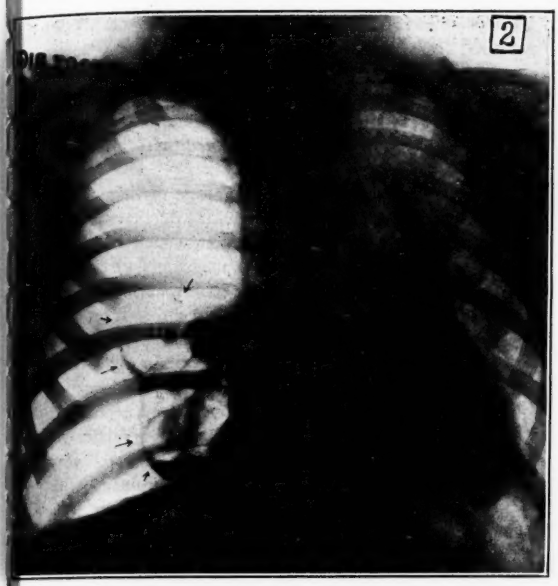

Fig. 2. Cluster of cysts in an infant, age 28 months. One of the cysts has ruptured, causing a pneumothorax, and another contains a fluid level.

have a cough and sputum, with some fever, until admission to the St. Louis Children's Hospital on May 19, 1931. Physical examination revealed a chronically ill infant with marked clubbing of the fingers. There were rales of various types throughout both sides of the chest. An x-ray film showed a large air pocket in the upper left chest. In differentiating the etiology of the air pocket, tuberculous and pyogenic cavities were excluded on account of the size of the cavity, lack of the usual associated changes seen in the x-ray, and the lack of the clinical syndrome of either disease. Solitary emphysematous blebs of this size do not occur in infants. An empyema cavity containing air would almost certainly contain a fluid level. The clinical picture, history, physical findings and x-ray pointed to a congenital cyst with associated acquired bronchiectasis. Lipiodol filling was not done on account of a complicating bilateral mastoiditis and the general poor condition of the patient. A bilateral mastoidectomy was performed one month after admission and the child died the following day. At necropsy a large smooth lined cyst, occupying the greater part of the upper left lobe, the wall of which was somewhat trabeculated, and no open bronchial communication was found. There was in addition extensive bilateral bronchiectasis with superimposed inflammatory changes.

Case 4. *Multiple Unilateral Infected Cysts Simulating Bronchiectasis.* (See Fig. 4.)

J. S. A fourteen year old white girl, who began having a chronic cough at the age of three months without history of foreign body, aspiration or acute respiratory infection. This cough had continued throughout her life without periods of acute illness and without fever. There was a slight amount of sputum for many years but it increased in amount and became moderately foul within the six months before admission and during this time there was considerable deterioration in her general health. She had slight hemoptysis and some night sweats shortly before admission. Physical examination revealed a very poorly nourished pallid girl with an offensive breath and moderate clubbing of the fingers. The percussion note was dull over most of the left chest and was hyperresonant over the right. The breath sounds were tubular in character over the lower portion of the left chest and whispered voice was increased. There were rales of many kinds heard over the entire left chest and some over the right. There was a to and fro friction rub heard at the left base at one time. Expansion of the left chest was greatly limited. The heart was apparently normal but the blood pressure was only 90/60. There was also a pansinusitis and faucial and lingual tonsillitis. The sputum was foul and it settled with a frothy float. No tubercle bacilli nor spirochaetes were found. X-ray film revealed enormous cyst-like cavities throughout the left lung in each of which a fluid level can be seen. Postural and bronchoscopic drainage was started but after a few weeks she went to her home, which was out of the city, and apparently developed an acute respiratory infection from which she died.

Case 5. *Large Cyst with Fluid, Infected with B. Influenzae.* (See Fig. 5.)

F. P. An eighteen year old white girl, who was first seen in the Chest Service in August, 1929. Her illness began two years before with a cough that began insidiously without history of preceding respiratory infection or foreign body aspiration. Sputum increased in quantity rapidly after that time and became foul. She had occasional periods of acute illnesses with chills, fever and sweats. Physical examination revealed a well

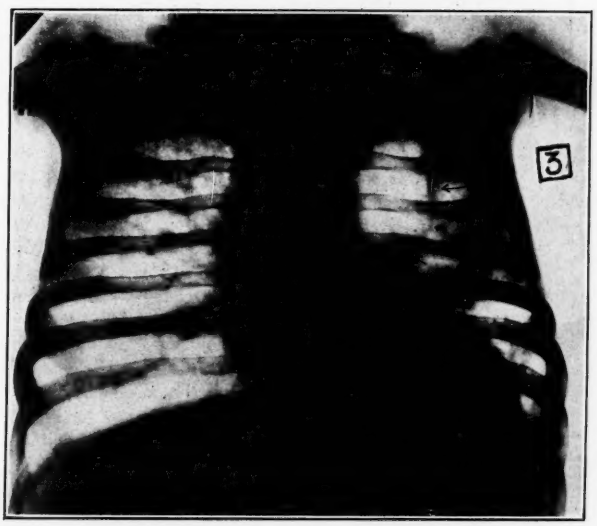

Fig. 3. Solitary upper lobe cyst in an infant, age 12 months. There is an associated diffuse pulmonary infection.

developed and nourished girl, apparently not acutely ill. Expansion was limited over the left chest and the breath sounds and whispered voice were of very high pitched quality over the lower left chest. Numerous rales were heard in both lower chests. There was no clubbing of fingers. Laboratory work revealed no very significant findings. The sputum was greenish yellow and slightly malodorous. No tubercle bacilli or spirochetes were found after many examinations and guinea pig inoculation. Culture of pus obtained by aspiration through the chest wall gave a pure growth of the Pfeiffer influenza bacillus. Lipiodol given by aspiration method did not enter any of the cavities, but one cavity was filled with lipiodol at the time of a bronchoscopic examination. The air pressure in one of the main cavities was plus four centimeters of water. Lipiodol injected through the chest wall into one of the cavities was soon coughed up by the patient. She ran a low grade fluctuating temperature. On September 17, 1929, Dr. Everts A. Graham resected a portion of the right ninth rib and found a thickened cyst wall which he did not open at that time. On October 1, the cavity was opened by use of the actual cautery. This drainage stopped the sputum from being coughed up, but she continued to have a draining sinus without fever for three months. On January 1, 1930, Dr. Graham resected two more ribs and made the opening for drainage wider. He performed a phrenicectomy on February 17, 1930. In spite of this treatment, which allowed adequate drainage, the cavities did not decrease in size. In January, 1931, an attempt was made to re-enter the cavity by posterior incision and it was necessary to remove some regenerated bone and to cauterize lung tissue. A severe hemorrhage occurred at this operation which required packing the wound. Five days later when the packing was removed a severe hemorrhage occurred from which the patient expired in a few minutes. A section of the wall of the cystic cavity showed a definite epithelial lining with flattened cells and inflammatory reaction throughout the wall.

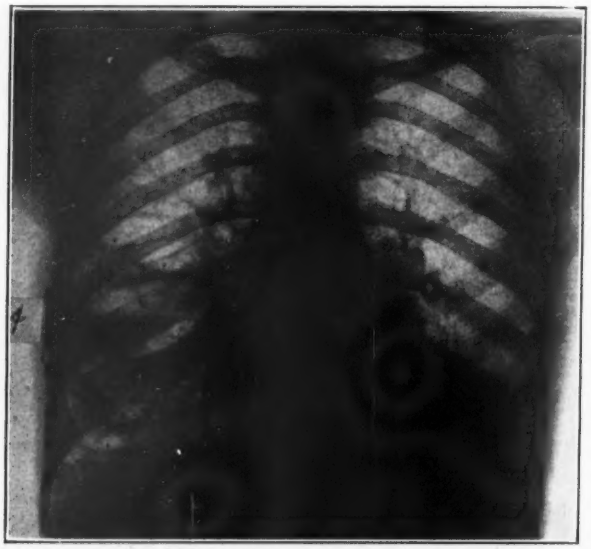

Fig. 4. Unilateral multiple infected cysts in a girl, age 14 years. Many of the cysts show fluid levels.

Case 6. *Multilocular Cyst Infected with B. Influenzae.*

A. M. A twenty-five year old garage mechanic, was first seen in the chest service in 1931. At that time he had cough productive of foul sputum which had been present for seven years. He had pneumonia as a child, but this cleared up after three or four weeks. His illness began in September, 1925, with chills, fever and severe pleurisy pain on the left side. A productive cough followed but he returned to work in six weeks. Cough continued without purulent sputum until August, 1928, at which time he suddenly coughed up a pint and a half of thick malodorous pus. Two years later he agaiin coughed up a quantity of pus. During the year before admission, he practiced postural drainage with success. Three hundred cubic centimeters of pus were obtained by postural change at time of first admission. He was well nourished and developed. There was no clubbing of the fingers, nor any respiratory distress. Over the left base there was dullness, absence of breath sounds and a few rales. No tubercle bacilli or spirochetes were seen in many examinations of the sputum. The roentgenologic appearance of this cyst was almost identical with that of Case 5. Pus obtained by aspiration through the chest wall and the sputum both gave pure cultures of Pfeiffer influenza bacillus. On April 8, 1931, Dr. Evarts Graham resected a portion of the eighth rib overlying the cavity and inserted a tube for drainage. A thoracoscope was introduced through the incised wound and a multiloculated cavity with glistening lining and bronchial fistulae was seen. The sinus continued to drain during the next five months and Dr. Graham performed a left phrenicectomy on October 5, 1931, after which the diaphragm was immobile but its height was not raised appreciably. On November 6, 1931, Dr. Graham removed the five ribs above the sinus from the transverse process to the posterior axillary line in an effort to collapse the cavity. Unfortunately the walls of the cavity were so rigid that they failed to collapse at all and pushed the mediastinum towards the opposite side before them. The patient still has a sinus from which there is only very slight drainage and a bronchial fistula communicates with the cyst. He refuses to allow an extirpation of the cysts.

Case 7. *Emphysema with Unilateral Cyst-like Areas in Upper Lobe.*

R. G. A forty-four year old negro, who had mild recurrent attacks of coughing and wheezing, which he called asthma, for eighteen years before he was admitted to Barnes Hospital in November, 1931. He never required any specific treatment for his respiratory ailment. His complaints at the time of admission were rapid loss of weight and abdominal distress. Examinations revealed a markedly emphysematous chest with dullness at the right apex and hyperresonance elsewhere. The breath sounds were amphoric beneath the

right clavicle and there were some postcough rales. X-ray revealed a cluster of cyst-like cavities at the right apex without parenchymal infiltration. These filled readily with lipiodol and seemed to be in the mid-portion of the lung. The position of the cysts and the ready filling with lipiodol more or less excluded the possibility that these were emphysematous blebs. His sputum was very scanty but numerous searches for tubercle bacilli were of no avail. He had no fever and had never had symptoms of tuberculosis. Some time later a tumor was felt in the right lower quadrant which, on exploration, was found to be an inoperable carcinoma of the cecum. He left the hospital and at the time of his death, autopsy was not possible.

Case 8. *Cystic Disease Associated with Bronchiectases.*

E. T. A thirty-eight year old man, who was free from respiratory symptoms until he was struck by a street car eighteen years previously. He was in bed for seven months thereafter, during which time he had cough and much sputum. He then was sufficiently well to resume work which he continued for one year. He then began having frequent pulmonary hemorrhages which lasted over a period of two years. During the ten years before admission to Barnes Hospital, he had repeated attacks of acute pulmonary infection and a chronic cough with some purulent material which was not particularly foul. Physical examination revealed generally diminished breathing over the right chest and many moist rales. He also had bilateral maxillary sinusitis. Lipiodol injection revealed huge multiple cyst-like cavities about 5 centimeters in diameter in the upper portion of the right lung. In addition to the large cystic cavities, there were cylindrical sacculations at the base of the right lung, which had the characteristics of acquired bronchiectasis. The history and the morphological characteristics, though far from conclusive, suggest that the cystic changes in the upper portion of the lung were congenital and that an acquired bronchiectasis had secondarily been added to complicate the picture.

Discussion. From a consideration of the literature and study of cases, it appears that a large proportion of the cysts may remain asymptomatic throughout the life of the individual, and that the presence of cysts is usually called to the attention of clinicians only when some accident occurs, such as rupture or infection.

In spite of the pathological confusion and unsettled theories of formation, the clinical features of lung cysts, though varied, fall roughly into rather definite groups. The variations in microscopic pathology have as yet no clinical correlations, but there are very definite syndromes which accompany certain gross pathological

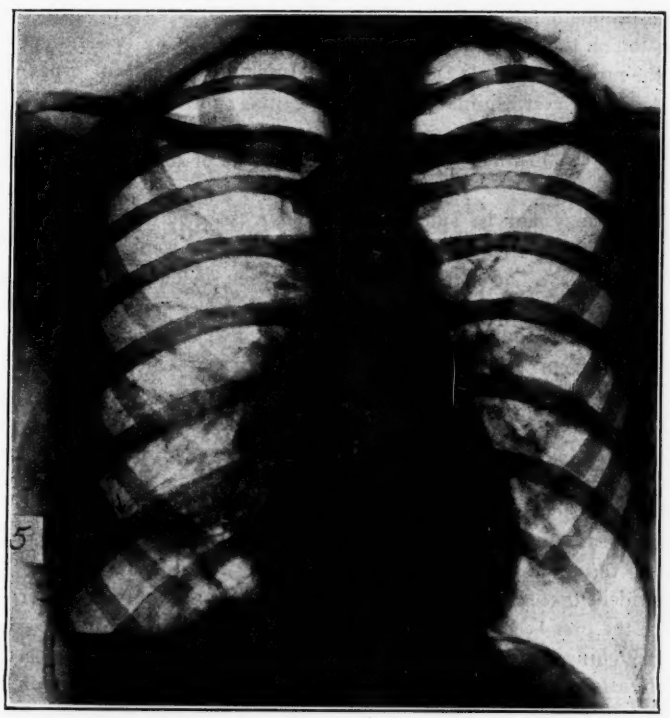

Fig. 5. Solitary cyst at base of right lung in a girl, age 18 years. The cyst has a thick rigid wall and shows a fluid level.

changes and which are often determined by mechanical and accidental factors. The strength of the wall, the presence or absence of a bronchial communication, the presence or absence of ball-valve mechanism at the bronchialar orifice, the anatomical relation of the cyst to other organs, the presence or absence of fluid in the cyst, and the presence or absence of infection determine the respective clinical picture. A satisfactory all-inclusive clinical classification has not as yet been made and this cannot be done until a much larger number of cases has been clinically studied.

Cysts in infants necessarily have thin walls, regardless of their origin. Elastic tissue is said not to appear in the lung until about the second month of life. If these cysts contain air they must communicate with a bronchus either permanently or intermittently; otherwise, air would be absorbed and the cyst would collapse. If the ball-valve mechanism occurs at the point of bronchial communication, air will be drawn into the cyst on inspiration and trapped during expiration. There is always very positive pressure in this type of cyst. The degree to which the cyst will expand depends on the strength of the wall and if it expands to fill one hemithorax, its effect in causing compression on the other lung depends on the mobility of the mediastinum. It is thought that if a rapidly expanding cyst originates in the parenchyma of the lung it is likely to cause rupture of the lung tissue and produce a pneumothorax.

The cyst wall itself may not be sufficiently strong to stand rapid inflation and may rupture. Many of the cases which have had a rapidly expanding cyst or pneumothorax have died after one or more attacks of great respiratory distress. Vollmer[8] aspirated air from his patient, who recovered. Our first case survived many attacks and was aspirated many times. He is now clinically well.

If no bronchial communication is present, or if the communication remains patent, there is no opportunity for the production of a rapidly expanding cyst because the air cannot be trapped. Probably, if this accident does not occur in early infancy, the wall of the cyst becomes sufficiently strong to resist stretching. Our first case no longer has desperate attacks of dyspea like those that threatened his life during his second year. Debre and Blinder[9] reported the case of a boy of seventeen with a voluminous air cyst, who had desperate attacks of dyspnea in early childhood, but in spite of persistent spontaneous pneumothorax is now clinically well. It seems quite possible that a cyst with a rigid wall may remain inflated with gas over a great period of time in the absence of a free communication with a bronchus. The gas within the cyst probably comes into equilibrium with the blood gases. Although there is some tendency to obliterate the air space by absorption of a part of the gas, the negative pressure created is not sufficient to collapse the wall. Certainly, pneumothorax pockets may persist in the chest for months or years without decreasing in size or filling with fluid. Several air cysts have been found to have no demonstrable bronchial communication at autopsy. Our third case was such a type. This condition will probably not be found in infants because the cyst wall is too flexible.

Infants and young children with cystic disease are apparently easily susceptible to associated pulmonary infection. Many of the reported cases have died of pneumonitis or bronchopneumonia. Our third case was first seen by a physician on account of pneumonia.

Infection in certain types of cysts is almost inevitable and is possibly due to inadequate drainage of cysts which communicate with bronchi. It may be of low grade with minimal symptoms or be very severe. It will be noted that in two of our cases, pure cultures of the Pfeiffer influenza bacillus were obtained. This finding has also been made in patients of Siems,[10] Clairmont,[11] Eloesser,[2] and Sauerbruch.[12] Marcerelli's[13] case died at eighty without infection in the hugh cyst which was present and Pollock and Marvin,[14] Siems, [10] Eloesser [2] and Mφller[15] have seen patients over forty with cysts that apparently were not infected. There was apparently no infection in the cysts of our eighth case, a man of forty-four.

Symptoms may be due simply to pressure of the cyst. Chest pain was the first symptom noted in several of the reported cases. Cough, apparently due to simple pressure on a bronchus, is the only symptom in some cases. A cyst has been known to occlude a main bronchus by pressure. A cyst may cause repeated bleeding, which, along with the cough and pulmonary cavities,

constitutes the usual syndrome of chronic fibroid tuberculosis.

Diagnosis. The history and physical examination of the individual case seldom lend important aid in the diagnosis of cystic disease without assistance from other methods. Although x-ray offers the most reliable information in most cases, it has definite limitations. Møller[15] describes the typical picture of multiple cysts as follows: "There is a peculiar disposition of the cavities in relation to one another, irregularly arranged, each one sharply delimited and separated from the others by a fine network of consolidation without any infiltration or pulmonary tissue between." The difference between tuberculous cavities, cavities caused by pyogenic infection and true cysts is determined chiefly by the thinness of the walls of the latter, which may be impressed by any solid structure with which they come in contact and by each other, and by the absence of associated changes usually seen in the former conditions.

Frequently the instillation of lipiodol by the supraglottal route, or by direct injection of the oil into a cyst through the chest wall previous to taking the x-ray film, will show the outline, extent, and communications of cysts not otherwise discernable. The cystic cavities may at times be definitely located, the contents examined, and the relationships determined by bronchoscopic examination. Direct operative exploration of a suspected cyst is the one absolute method of diagnosis. When a cyst is explored a biopsy of the wall should be taken.

Many of the cases, reported as congenital cystic disease, are probably not unlike those recorded by other authors as congenital or acquired bronchiectasis. When multiple cysts become infected, they show the complete clinical picture usually seen in bronchiectasis. The differential points between cysts and certain forms of bronchiectasis are not well defined but the former are usually larger, more nearly spherical and more discrete. History of onset of symptoms early in life and absence of a definite etiologic factor favors the diagnosis of cyst. Demonstrable bronchial communications of a true cyst are sometimes absent but are always easily demonstrable in bronchiectasis.

Single or multiocular cysts which become infected simulate acute or chronic empyema or lung abscess. Operations for supposed empyema have been responsible for the diagnosis in several cases of lung cysts. Krampf,[16] Neuhoff,[17] Eloesser[2] and Graham (two of our cases) have operated on cysts with previous diagnosis of empyema. The finding of a well defined wall about the cavity with epithelial lining and other characteristics of some portion of the bronchial tree confirms the diagnosis of cyst.

Solitary cysts containing fluid are a most difficult diagnostic problem. If there is air above the fluid, a fluid level is obtained and the picture may be almost identical with that of a lung abscess, tuberculous cavity, or empyema with bronchial fistula. Recourse to history of the case, process of exclusion and operative exploration are the only means of differentiating cysts from such conditions as the above and from many other tumor like shadows seen in the x-ray caused by retrosternal struma, diverticulum of the esophagus, gravitation abscess from caries of a rib or gland, aortic aneurysm, benign and malignant tomors, and lastly, false cysts—cystic degeneration in neoplastic tissue as in dermoid cysts and malignant growths and cystic degeneration following inflammatory reactions.

A hugh air cyst can hardly be differentiated from pneumothorax without the x-ray, although one may suspect the condition from a history of repeated attacks or respiratory distress and cyanosis. The presence of a pneumothorax either spontaneous or induced (see Pollack's case[14]) may allow the wall of cyst to be shown in an x-ray film. The characteristic hilus stump, which is always present with complete pneumothorax, is not seen in a voluminous cyst.

Prognosis and Treatment. The relatively high mortality in infants and young children with cystic disease is due chiefly to the fact that the reserve of the respiratory mechanism is not great. They cannot compensate for changes in pressure and position caused by large cysts and their reserve is very low when there is an associated pulmonary infection. The outlook is not necessarily bad even in the very young. If fatal accident is prevented by well timed aspiration of air, the air of the cysts may eventually be absorbed and a clinical cure results. Our first case is now apparently clinically well. Vollmer aspirated a cyst and reported a clinical cure. If death does not result at the time of the rupture of a cyst,

the child may live indefinitely with a pneumothorax. Debre and Blinder's[9] case apparently had a pneumothorax for many years and was not debilitated. There is not sufficient available information from similar cases to prophesy what harm may result from a persistent pneumothorax. If the branch of the bronchus which communicates with the cyst can be stenosed, the portion of the lung containing the cyst will probably collapse and the remainder of the lung will reinflate. In infection occurs in the cyst, the possibility of a permanent cure is greatly diminished.

The problem in multiple cysts which are infected is similar to that of severe bronchiectasis. The conservative measures, namely, postural drainage, vaccine administration, bronchoscopic drainage, etc., have been employed many times without gratifying results. Phrenic exeresis has not been reported to be of value in obliterating cysts. Dr. E. A. Graham performed phrenicectomy on two of our cases. Artificial pneumothorax has been used as a diagnostic measure in order to outline a cyst wall. This procedure will probably not be a valuable therapeutic method because the cysts are displaced by the air but not obliterated. Eloesser[2] performed a lobectomy, removing a group of infected cysts in a young woman with complete cure. Our fourth and fifth cases died after prolonged debilitating illnesses during which time no treatment was of value. Patients with multiple infected cysts have been reported by Gibson,[18] Eloesser,[2] Møller[15] and others which have suffered little deterioration in health.

Infected solitary cysts lend themselves to therapy more readily than multiple cysts. Drainage by rib resection has been instituted frequently with great improvement in the patient's general condition but permanent fistulae have always resulted because the cyst is not obliterated. Extirpation of solitary cysts have been reported by Clairmont,[11] Melschoir,[19] Krampf,[16] Sauerbruch,[12] Møller,[15] Ehlers[20] and Harrington,[21] with five apparent cures and four deaths directly attributed to the operation. Sauerbruch[12] combined thoracoplasty with extirpation of the cysts in one case. Dr. E. A. Graham has performed a partial thoracoplasty in two of our cases without materially affecting the size of the rigid cysts.

A therapeutic suggestion has been made by Dr. W. E. Adams.[22] He believes that if all the cysts in a given case are in relation to one division of a bronchus, stenosis of this bronchus will cause collapse of the portion of the lung containing the cyst and the air in the cyst should eventually be absorbed. Stenosis of bronchi in man has been done by Adams who applies 35 per cent silver nitrate through a bronchoscope to the bronchial mucosa. Adams has also suggested that silver nitrate could be injected into cysts in an effort to destroy the lining epithelium and give better opportunity for obliteration of the cavity.

Upper respiratory infections are a serious menace to patients with cystic disease. Apparently, in some instances a "vicious circle" is set up so that infected nasal sinuses and cysts each increase the seriousness of the other. Measures should be taken in every case to prevent or, if possible, eradicate all chronic upper respiratory infections.

CONCLUSIONS

Modern diagnostic approach to chest diseases has made possible the recognition of an increasing number of lung cysts in many countries during the past few years and surgical technic is constantly being perfected in order to provide effective therapy. Non-parasitic cysts may simulate in many ways parasitic cysts, bronchiectasis, empyema, lung abscess, emphysema and tuberculosis. These conditions must be kept in mind in the differential diagnosis of the obscure case. Recourse to all available investigative methods may be necessary to arrive at the correct diagnosis. History, physical examination, x-ray films and fluoroscopy after filling the bronchial tree with iodized oil, diagnostic pneumothorax and operative exploration all have limitations but when used judiciously, intrathoracic lesions become more vivid and their size, shape, position, consistency, mobility and attachments may be determined.

Treatment of cysts must be instituted with a knowledge of the physiologic and pathologic background and in many cases eminent success may be obtained.

Eight cases of cystic disease, which have been observed in the chest service of Barnes Hospital in the past five years, have been presented. These cases have been discussed along with a cursory review of the 172 cases that have been reported in the world literature.

It is hoped that sufficient interest in this and

other non-tuberculous diseases will be stimulated so that fewer cases will go unrecognized.

819 Ridgely Building.

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DISCUSSION

Dr. M. Pollak, Peoria: It is not so very long ago that nearly every case of a chronic pulmonary condition was diagnosed as tuberculosis. Since the use of x-ray, we are learning more and more that there are other chronic diseases of the lung besides tuberculosis.

We say today that cancer of the lung is on the increase, but this is so perhaps because we are diagnosing today cancer of the lung more frequently because we are making more frequent and better use of our diagnostic methods.

In every chronic disease of the lungs, naturally pulmonary tuberculosis is the first disease we think of. And it is quite important that an accurate differential diagnosis be made because an accurate diagnosis has quite a definite bearing on our treatment. In making the diagnosis, history, sputum and x-ray examinations are of the greatest importance. In every case of chronic lung disease where a considerable amount of sputum is examined repeatedly and reliably and is found negative for tubercle bacilli, we have every reason and right to question the diagnosis of tuberculosis and other conditions have to be thought of; among them, cystic disease of the lung is one that should be remembered.

We see from Dr. Pearson's excellent paper that, after all, cystic disease of the lung is not so very rare as we have thought it before. If one man can collect in a relatively short time so many cases in a Chest Service, as excellent as that Service might be, it shows that the disease is fairly frequent.

Cystic disease of the lung, as you have seen from Dr. Pearson's paper, has as its most frequent complications spontaneous pneumothorax. We hear every so often of cases of spontaneous pneumothorax which originate on a non-tuberculous basis. I believe that these are caused either by cystic disease, or by the rupture of an emphysematous bleb. The differential diagnosis of the underlying cause of spontaneous pneumothorax is exceedingly important as far as our treatment is concerned. If the pneumothorax originates on a tuberculous basis, we will try to maintain it and convert the spontaneous into an artificial pneumothorax as a matter of treatment. If it originated from a non-tuberculous lung as a cystic disease, or an emphysematous bleb, we will permit it to become absorbed and the pleural cavity obliterated again.

The differential diagnosis of cystic disease from large emphysematous blebs is not entirely simple—at least to my mind—and much work will have to be done in this regard. I believe that a closer study of the chest radiograms will lead us to a better differential diagnosis.

I want to congratulate Dr. Pearson for his excellent paper. I certainly enjoyed it.

SACROCOXALGIA

JOSEPH E. ALLEGRETTI, M. D.

Clinical Instructor, Rush Medical College, University of Chicago

CHICAGO

Definition. Sacrocoxalgia or sacrocoxitis is an acute or chronic inflammation of the sacroiliac synchrondrosis due to a subluxation or arthritis of one or both joints, producing pain of varying intensity in the lower back, and often incapacitating the patient from his occupation. Although the condition is very common and disabling, it is given very little attention in our medical text-books.

Etiology. Trauma is a very important and prominent part of the history in over 90% of patients; this may vary from a slight twisting of the back to a dislocation of the sacroiliac joint. A fall directly on the coccyx or sacral region, heavy weight lifting, or strain from occupation or exercise are all etiological factors. Foci of infection are as important here as in arthritis, neuritis, or myositis of any other part of the body.

Symptomotology. The onset is usually sudden, brought on by some injury confining the patient to bed immediately, but may be gradual, brought on by repeated minor traumas. Pain in the lower back is the outstanding complaint, varying from a dull ache to an intense sharp pain on the slightest movement. The pain is aggravated by sitting, standing, or stooping over. Coughing and sneezing intensify the distress

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because of the sudden action of the abdominal muscles producing a drag on the iliac bones. If both sides are severely involved the patient is bedridden; but if he is able to be up he limps, is bent forward and bears his weight on the unaffected side. The course is progressive and chronic over a period of years (some 5-15 years); is marked by periods of acute exacerbations, and is very resistant to treatment.

Examination and Diagnosis. (a) In the standing position, the patient is bent over, holding his hand on the affected joint; it is noticed that the pelvis is tilted downward and forward toward the sound side. This causes the leg on the affected side to appear longer.

(b) In the sitting position, it is noticed that the weight of the body is mainly taken on one ischial tuberosity. The pain can be aggravated by dividing the weight equally between the two tuberosities, or by asking the patient to reverse his position. The region of the sacroiliac joint may be swollen, puffy and tender if the condition is very acute. Movements at the lumbosacral articulation are painful, but this is because of the pull on the iliac bones. The pain is often referred to the gluteal region, only because of a secondary involvement of the sciatic nerves. If the pelvis is firmly steadied the body can be bent forward or backward and the legs moved with comparative ease. Forcible manual separation of the innominate bones produces severe pain, while compression tends to relieve.

(c) In the supine position if the hips are flexed with the knees straight, pain is intensified at the involved sacroiliac joint (this is known as backward torsion strain). With the patient lying on his face, bending the legs backward with the knees extended produces a forward torsion strain.

By the above manipulations pain at the sacroiliac joint may be reproduced, aggravated, or relieved depending upon the type of torsion present; and thus the degree of involvement and exact location can be determined.

Torsion strain causes the pain in the majority of patients with sacrocoxalgia, yet the x-ray findings are negative: only in cases of dislocation or arthritis of the joint the x-ray may show definite subluxation or lipping of the bony margins.

In the differential diagnosis must be considered arthritis or subluxation of the lumbosacral articulation; coccydynia, sacralization of the fifth lumbar vertebra; neuritis of the sacral plexus, sensitive deposits near the tip of the coccyx and exostoses and fractures of the fourth and fifth lumbar vertebrae, sacrum or coccyx. Specific diseases such as sacroiliac tuberculosis, hip joint disease, pelvic and rectal diseases causing pain in the lower back must be carefully ruled out. Various types of tumors of the bones of the sacrum and pelvis, although not common, may cause intractable pain in the lower back.

Pathology. The morbid anatomy found in the greatest number of patients suffering with sacrocoxalgia is a torsion or subluxation of one or both sacroiliac joints with a resulting injury and inflammation of the synovia. Later abnormal adhesions are formed around the affected joint involving the synovia, joint margins and nerve endings. With the deposition of calcium the joints may become the site of marked arthritic changes.

Treatment. The first step is the removal of neglected foci of infection and general measures carried out as in other neuritic and arthritic involvements.

Then the back is carefully manipulated as suggested above under examination, the degree and type of torsion ascertained, and an attempt is made to overcome this torsion by proper manipulation. By this treatment, if correctly carried out, a great deal of pain can be relieved in some patients. Then a tight binder is applied around the pelvis to keep the joint in position. This may be accomplished by adhesive straps, binders of stout cloth or specially constructed belts. Many patients in spite of all one can do obtain very little relief.

Epidural Injections. It is for such patients that a study was begun to determine the effects of epidural medication on sacrocoxalgia and various allied conditions.[1] The method itself is not original, but was suggested by Cathelin[2] in 1901 when he attempted treating "various pelvic neuroses" by injection into the sacral canal of medicated solutions. The technic is as follows:

With the patient lying on his abdomen, the opening of the sacral canal is sought for with the fingers. This is located below the last sacral spine, just above the articulation with the coccyx. The skin over this area is cleansed with alcohol and infiltrated with a small amount of 0.5% no-

vocaine. A dry piece of sterile gauze is placed between the buttocks over the rectum to avoid contamination. Aseptic precautions must be observed at all times. The danger of infection[3] of the epidural space must be always borne in mind. A needle 8 cm. long and No. 19 gauge is inserted into the opening at the apex of the sacrum. The angle at which the needle is inserted varies with different patients depending on the configuration of the bone and the thickness of the soft parts. The usual angle is between 20-30 degrees, but once in the canal the needle is pushed upwards parallel to the long axis of the bone for 4-6 cm. After pushing the needle through the skin considerable resistance is encountered at the sacrococcygeal ligament. Once through this point the needle glides in easily. Sometimes difficulty is experienced in locating the sacral hiatus; and occasionally it is impossible to enter the canal, especially in fat women or patients with deformities of the sacrum, arthritic changes of the sacro-coccygeal joint or unusual tilting downward of the sacrum. In cases of incomplete formation of the sacral canal the opening will be found 2-3 cm. above the sacrococcygeal joint. Before injecting it is well to be sure that neither vein nor dura has been pierced, especially if a novocaine solution is to be used, this being determined by withdrawing the plunger of the syringe. The dural sac ends opposite the second or third sacral segment. The remaining space in the sacral canal is filled with cellular and fatty tissue and contains a rich venous plexus and nerve trunks which form the sciatic and pelvic nerves running from the end of the dural sac to the sacral hiatus.

The injection consists of either normal saline or 0.5% novocaine in sterile water; the latter is used in more sensitive patients. The solution must be at body temperature. 20 cc. to 100 cc. may be used depending on the size of the sacral canal, the resistance encountered and the patency of the sacral foraminae. Usually 50 cc. is sufficient for the average patient. The relief is usually immediate. During the injection the patient experiences some pain in the lower back, especially if given too rapidly and states that he feels the solution traveling down the affected side or leg.

Occasionally a patient may complain of pain at the site of injection for 1-2 days. Hot applications usually give prompt relief. Some complain of dizziness and faintness when more than 50 cc. is given. This may be due to pressure on the end of the dural sac transmitted up towards the head, or to the fluid actually passing up to the cervical region (Ott).[4] If novocaine solution has been used the symptoms may be attributed to rapid absorption of the drug towards which the patient may have an idiosyncrasy. (Rare.) When novocaine is used it is advisable to use a weak solution (0.5%) and inject only 10 cc.; after five minutes if no reaction occurs injection may be continued without any danger. Having the patient sit up for a few minutes and giving a little cold water to drink has sufficed for the treatment of any untoward symptoms in this series. There is no after disturbance because the solution does not enter the subarachnoid space, but is extradural. No after treatment is required; the patient immediately arises and leaves.

The total number of patients treated by this method including sciatica, chronic arthritis of the back and coccydynias number over two hundred. However, this report consists of 64 patients with definite sacroiliac involvement of varying degrees. The ages ranged from 30 to 70 years, and the duration from 2 to 18 years. 59 patients (92%) were completely relieved of the pain at the time; 2 (3%) partially relieved and 3 (5%) obtained no relief. Of the 64 patients, 50 received only one injection; 11 received 3 injections, at varying intervals of one week to one month; and 3 received 5 injections, 1 month apart each time, obtaining very little relief. The duration of relief varies. The longest has been 18 months, and the shortest one month. A large number are still under observation being watched for recurrences. The first injection seems to be the most effective if at all successful. After the fifth injection, if no relief is obtained it is futile to continue. It has been noticed that if the first injection was not made into the sacral canal but in the surrounding tissues, subsequent injection, although in the canal, is less effective and less certain to produce permanent relief.

SUMMARY

1. Epidural injection of saline has completely relieved the pain of sacrocoxalgia in 92% of patients.

2. The injection is harmless and gives relief in many instances where other methods have failed.

3. There are no dangerous untoward symptoms following the injections.

55 East Washington Street.

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DISCUSSION

Dr. H. A. Bollaert, East Moline: To talk on the subject of low back pain takes considerable courage. It is a subject that has been talked about a great deal and once in a while we get a new thought.

In his paper Dr. Allegretti spoke about the great percentage of these sacroiliac pains being due to trauma. Quite a bit of controversy exists about this question. Some Englishmen who have a series of 2250 cases showed that in 1350 of these cases they have definite findings of arthritis, and although the symptoms may appear to be due to the immediate trauma, there is usually an underlying arthritis of the sacroiliac joints.

I think the Doctor has given us a number of points in diagnosis. He has given us several findings that we do not ordinarily find in looking over the literature that ought to help us distinguish sacroiliac conditions from sacrolumbar, and from myositis of that region.

As to treatment, this injection of the epidural space is a relatively new treatment and seems to be of considerable benefit to these people who suffer from low back pain. How much of this treatment can be carried out by the private practitioner in his private patients in his office is a question that will have to be answered by the private practitioner. We get these patients coming into clinics and they do what we tell them to do. I presume we can get them to take this kind of treatment. These patients, however, have gone long enough and tried every treatment that every doctor has suggested without success, and no doubt will go to epidural injections and appreciate the relief they get.

I would like to ask the Doctor what his experience is in the use of colloidal sulphur in these arthritic cases. I think it is worth while in arthritis or neuritic cases when other methods have failed to try colloidal sulphur intravenously. I think you will find a certain percentage of relief by the use of that method. Foreign proteins intravenously frequently give relief in arthritic cases.

In the methods of immobilizing the parts, I think we should not forget the use of body casts or rather back casts put on in a hyperextended position or a position of lordosis. Physiotherapy frequently helps these cases and I think in the beginning it is a good thing to use physiotherapy.

Dr. Joseph E. Allegretti, Chicago, (closing): Concerning the arthritis, we find in our experience that that is usually a later finding. The first thing is usually an inflammation of the synovia or a subluxation. I did not make much point of that because of the necessity of making the paper short. Arthritis is a very important cause of pain and it is a very difficult condition to treat.

As to the injection treatment, I think it is really a very simple procedure, and it does not take much persuasion on the part of the doctor to have the patient take the treatment. The injection is very easily given and there is not much pain connected with it. The relief of pain will make the patient willing to have it done.

I have not used the colloidal sulphur, but we have used nearly everything else, small doses of salvarsan, autogenous vaccine, diathermy, and all sorts of proteins prepared by different manufacturers.

These patients here reported nearly all had had previous treatments. In the clinic at Rush we use all other treatment first and then use the injections of the epidural space. We occasionally have to resort to casts to get relief. That is a point I wish to mention, that in correcting the torsion if we find that belts or adhesive are not adequate, casts must be applied in the correct position, after the injection treatment.

THE IMMEDIATE TREATMENT OF COMPOUND INJURIES

SUMNER L. KOCH, M.D.

CHICAGO

The effort to make clear in the minds of medical students and young surgeons the underlying principles involved in the immediate treatment of compound injuries deserves the support of every member of this society because compound injuries are serious, because they are constantly increasing in number, and because the physician who sees the patient immediately after the injury has the best opportunity of securing for the patient the most satisfactory results.

The arrest of hemorrhage, the treatment of shock, a careful and systematic examination of the patient suggest themselves immediately as of first importance in the treatment of a patient who has just sustained a compound injury. Without further consideration of these well recognized principles I would like to discuss briefly a few other factors which we believe of very great importance. They are:

1. The technique of preparing the injured for operation.

2. The conversion of the contaminated wound into a clean wound.

From the Department of Surgery, Northwestern University Medical School.

Read before the Surgical Section of the Illinois State Medical Association, Springfield, Illinois, May 16, 1934.

3. The conversion of the compound injury into a simple injury by closure of the wound, either immediately or by a delayed primary suture.

1. *The technique of preparing the injured patient for operation.* 2. *The conversion of the contaminated wound into a clean wound.*—Again without discussing the treatment of shock, or the choice of the most suitable anesthetic I would like to consider briefly first the problem of preparing the field of operation. We are particularly interested in two things: not contaminating the wound further; not adding additional injury to that which has already taken place. Briefly, our plan of procedure is to cover the wound itself with sterile gauze; then with cleansed hands or hands covered with sterile gloves and with sterile sponges to wash a wide area about the wound gently but thoroughly with soap and water; finally to remove the sterile gauze covering and protecting the wound, and to wash the wound itself patiently, gently, but thoroughly with soap and water. If the wound is irregular and deeper pockets are present underneath torn flaps of skin and subcutaneous tissue this process of cleansing the deeper portions of the wound with soap and water is repeated after the sterile linen has been placed about the field of operation, and while the wound edges are held back with sterile retractors. Finally, any excess of soap solution is washed away with more sterile water. No antiseptic solutions such as tincture of iodine or hydrogen peroxide are used, either around the wound or in the open wound.

Such cleansing with soap and water may be all that is necessary to convert the contaminated wound into a clean wound. If, however, injured or devitalized tissue is present it should be exercised, with every care both to make such excision complete and not unnecessarily to sacrifice sound tissue.

3. *Closure of the wound.*—The next step is repair of the deeper tissues and closure of the wound; and so conversion of the compound injury into a simple injury. If one is satisfied that cleansing of the wound has been accomplished, it seems to us quite as illogical to leave the wound open for an indefinite period as it does to leave a herniotomy wound open after repair of the defect in the muscles and fascia. Complete healing and restoration of function will take place most rapidly if the open wound is closed and heals without infection. The wound left open is certain to become infected within a few days.

If at the primary operation one is in doubt as to whether cleansing of the wound has been accomplished it is always possible to pack the wound lightly with a non-irritating dressing, such as gaue saturated with petrolatum, and carry out a delayed closure twenty-four hours later. If cleansing has been accomplished the wound can still be closed, and still heal by primary union.

I realize as keenly as you do that there is nothing new or nothing original in these ideas. They are simply a repetition of lessons learned by many men and at great cost during the World War, but lessons that unfortunately are not being persistently taught in our schools and hospitals, and so not being learned by younger surgeons as they graduate into practice. On the other hand the medical profession is so continually bombarded with literature extolling the virtues of this and that antiseptic that we are likely to lose sight of the fact that if skin and the tissues exposed in open wounds are carefully cleansed with an efficient solvent of dirt and grease that does not itself injure living tissue—in other words, with soap and water, no antiseptics are necessary, and by avoiding the addition of chemical trauma to the delicate and fragile tissue exposed in open wounds we can make the much desired healing by primary union and without infection more certain of attainment.

Four examples may help to emphasize these points.

Case 1. This patient, a workman of 40 years, was admitted to Passavant Memorial Hospital, March 29, 1934, shortly after he had sustained a crushing injury of the left hand. While repairing a freight elevator he was suddenly carried upward, clinging with his upstretched hands to the floor of the elevator. His left hand was badly crushed between the floor of the elevator and the upper beam of the doorway just as the elevator was brought to a stop. The soft tissues over the dorsum of the metacarpus were crushed and torn away, the skin over the dorsal surfaces of the proximal phalanges of the index, middle and ring fingers was white, bloodless and insensitive. Over the metacarpus a part of the extensor indicis proprius had been avulsed; the surface of the common extensor tendons to the index and middle fingers was ragged and torn, but the tendons were not divided.

After the hand and forearm had been shaved and

cleansed with soap and water the wounds themselves were carefully cleansed. The crushed and lacerated edges of skin about the wound on the metacarpus were cut away, leaving a denuded area involving almost the entire dorsum of the hand. The free ends of the partially destroyed extensor indicis proprius were sutured to the adjacent tendon of the common extensor. A free full thickness graft of skin of the exact size and shape of the defect was then dissected free from the abdominal wall and sutured accurately in place over the defect. A second similar graft was used to fill the defect in the dorsum of the ring finger. On the middle and index fingers it was possible to approximate the skin edges, after excision of the devitalized skin and subcutaneous tissue.

When the pressure dressing was removed and the wounded areas examined for the first time eight days after operation it was seen that a small area of dry necrosis, approximately one inch square, had developed where the large graft lay over bare extensor tendons. Elsewhere the grafts had healed perfectly. This necrotic portion of the graft was cut away a few days later, and the patient left the hospital three weeks after the injury. When healthy granulation tissue had formed over the raw spot, thirty-seven days after the injury and primary operation, a thin graft was laid over the granulations and healing was complete a week later.

Case 2. This patient, a man of 35 years, on April 29, 1934, tripped over a rug and as he fell thrust his left hand through the glass of a French window toward which he was walking. He sustained a deep transverse wound just above the wrist, with immediate and profuse bleeding. A doctor in the room immediately applied compression above the wound and shortly afterward applied a sterile dressing and pressure bandage over the wound. When I saw the patient ninety minutes later he could flex all his fingers well, but had a complete loss of sensation in the area of median nerve distribution and loss of the ability to rotate his thumb so that it faced the fingers.

The patient was immediately taken to the operating room and the hand and forearm carefully cleansed with soap and water; finally the wound itself was cleansed very gently with soap and water. After the field of operation had been protected with sterile linen examination of the wound showed in addition to complete division of the median nerve, division of the tendons of the palmaris longus and the superficial flexor to the middle finger, and partial division of the tendons of the superficial flexors to the ring and little fingers, the flexor pollicis longus and the flexor carpi ulnaris. The injured tendons were repaired, and finally the median nerve accurately reunited with very fine silk sutures. The wound in the skin and subcutaneous tissue was accurately closed without drainage and a light splint applied to maintain immobilization and volar flexion at the wrist.

The wound healed by primary union and the patient was dismissed from the hospital on the third day after operation. Some of the skin sutures were removed on the eighth day and the remainder on the eleventh day.

Case 3. This patient, a girl of 5 years, was admitted to Passavant Memorial Hospital, April 29, 1934, shortly after having sustained a number of lacerated wounds of the left ear and left side of the face and neck as a result of an attack by a pet dog. There were seven distinct wounds, the two largest involved the face just in front of the ear, and the left upper lip and cheek. In the former a flap had been torn forward from the region of the tragus, with wide exposure of the parotid fascia and a small wound in the parotid gland itself. The largest and most serious wound extended through the entire thickness of the upper lip and cheek from a point one-fourth inch medial to the left lateral angle of the mouth to a distance of one and one-half inches upward and lateralward.

The wounds were carefully cleansed in turn with soap and water, and finally well irrigated with sterile water. Each in turn was sutured as accurately as possible, the wound extending into the mouth last of all. All the wounds except the last healed by primary union. The edges of the external, facial portion of the last wound separated slightly after removal of the fine horsehair sutures, but no infection took place and no leakage of secretion from the mouth. By keeping the wound edges approximated with gauze strips sealed with collodion to the skin at the sides of the wound, healing took place without further complications.

Case 4. This case, added for contrast, is quite a different story. The patient, a man of 33 years, was admitted to the Cook County Hospital, December 7, 1933, shortly after he had sustained an extensive lacerated wound of the left forearm with almost complete avulsion of a large flap of skin and subcutaneous tissue involving approximately three-fourths of the dorsal surface of the forearm, with resulting exposure and superficial injury of the underlying extensor tendons. The avulsed flap was still attached by a distal pedicle one and one-half inches in width.

The description of the immediate treatment given by the house officer is taken verbatim from the hospital record. "The wound was cleansed with green soap for a period of ten minutes. Iodine was flooded over the wound and swabbed into all portions of it. Alcohol was not spared. Tissues, loose and soiled, were debrided. Tendons were left intact. Wound was then bathed in hydrogen peroxide. Skin was closed with thirty-seven silkworm sutures."

When I first saw the patient five days later the left hand and forearm were tremendously swollen and inflamed. The flap of skin and subcutaneous tissue which had been sutured in place was grayish white and insensitive. Thin pus was oozing between the sutures from underneath the flap. When the sutures were removed and the gangrenous flap cut away a large mass of swollen, grayish yellow semi-necrotic tissue was exposed.

With the help of large warm wet dressings, elevation of the part and aseptic care the spreading infection was localized, and subsequently with the help of Dakin's solution and continued care in the application of the dressings the large raw area was transformed into a healthy granulating wound. Seven weeks, however, had passed before the wound was sufficiently clean for skin grafting. On January 26 one large thin graft

which covered the entire wound was applied over the raw surface. The graft healed by primary union.

The patient was dismissed from the hospital, February 13, 1934, sixty-nine days after the injury and after his admission. At that time the forearm was completely healed, but it was still necessary to support the wrist and fingers in a cock up splint, and movements of extension at the wrist and of the fingers and thumb could be carried out only weakly and with considerable difficulty.

These cases emphasize in addition to the points already stressed the facts that:

1. If superficial tissues have been destroyed at the time of injury they can and should be replaced *immediately by some type of graft* or flap, so as to ensure the third desideratum—transformation of the open wound into a closed wound.

2. That under favorable conditions primary nerve and tendon suture can be successfully accomplished, and thereby save for the patient *time, expense, function and the necessity of further* operative procedures.

3. That with sufficient care, and by not injuring still more the delicate subcutaneous and deeper tissues, wounds made by infected instruments—for example a dog's fangs—can be cleansed and transformed into wounds that are sufficiently clean to permit healing by primary union.

4. That chemical antiseptics do not safeguard the patient against infection and do not form an adequate substitute for careful cleansing with soap and water, gentle handling of tissues, and avoidance of both mechanical and chemical trauma.

5. And lastly, that accurate and painstaking care in the immediate treatment of compound injuries can save time; expense for the patient, his family, the municipality or those on whom the financial burden falls; and, most important of all, can save the function of a part that may be irreparably injured by the methods of treatment so frequently applied.

DISCUSSION

Dr. D. J. Lewis, Springfield: Dr. Koch's presentation has consisted in bringing before us surgical principles involved in acute injuries. I had the pleasure of reading his paper several times and find myself in complete agreement with the principles he presented. I would like to take this opportunity of emphasizing and bringing again to your attention the important points that he has brought out.

His first important factor is to so prepare the wound that no contamination takes place; second, relieve the wound of devitalized tissue so that repair of the wound may begin at once. Remember that this process of repair takes place only when vital tissue contacts vital tissue. Third, to so handle the wound that you do not cause mechanical or chemical injury. Alcohol solution or other chemicals, and mercuric compounds, actually coagulate the tissues. I think we can see the folly of this procedure—after carefully relieving the wound of devitalized tissue to further devitalize it by some chemical.

I wish Dr. Koch would be more specific in what he means by soap solution. I know some soap solutions contain alkalies which are irritating. Hypertonic and hypotonic solutions placed on tissues not accustomed to such solutions not infrequently cause devitalization of a small area of tissue. I believe that the application of sterile salt solution in some cases is as effective as the application of soap solution. I am not sure that washing the wound with soap and water makes it a clean wound. I would agree that it makes a relatively cleaner wound. I am surprised at how much Nature does in these wounds. By removing some contamination we are aiding natural processes and I do not think we can take all the credit for cleaning up a wound. I would suggest that a dry wound is desired before closure is begun. One must be careful that there is no tension on the suture line as this causes sloughing of tissue. Early skin grafting makes for restoration of tissue. In the closing I would like to emphasize another surgical principle, that is immobilization of the injured part for at least one week after injury.

Dr. O. H. Deichmann, Springfield: I would like to ask Dr. Koch if he used tetanus antitoxin in the patient that was crushed in the elevator.

Dr. Charles P. White, Kewanee: I would like to ask Dr. Koch if he finds it necessary to use gas bacillus vaccine of any kind and if so what preparation would he use. I presume that Dr. Koch has cleansed his wounds very thoroughly; many of us have tried to do that and have been surprised to find in twenty-four hours gas bacillus present and causing a lot of trouble. That has come to my attention three times in the last year after we felt we had done everything possible. What value would there have been had gas bacillus vaccine been used in such cases as a prophylactic?

Dr. Edward H. W. Kupke, Beecher: I would like to ask Dr. Koch if he wishes to imply that all antiseptics are contraindicated. If they are not beneficial they should be eliminated. If they are beneficial, which ones does he think are most valuable? If local antiseptics are of no value and soap and water be used, what specific soap does he employ?

Dr. Charles C. O'Byrne, Chicago: Concerning devitalized tissue and its replacement, skin that is taken from the back of the hand would be just as likely to live as skin from the abdomen. I think many times we remove skin that we think would be devitalized, whereas by placing in position without tension it would live. I remember a man who came to the hospital with the entire skin torn from the index finger. I looked it over and while considering what to do, he

reached in his pocket and pulled out the skin, saying, "would this be any help to you?" I turned it right side out and sewed it back on the finger. In a week you could not tell that it had ever been torn off. I think we are too free in removing tissue that is not entirely macerated.

Dr. Harry Mock, Chicago: I think most of us are in full accord with Dr. Koch on most of his paper. As brought out, there are wounds and wounds. I would like him to dwell a little more on secondary closure. There are so many serious crushing wounds, where it is impossible to state which tissue is completely devitalized and which tissue will grow. I cleanse these wounds and then pack with a piece of gauze saturated with Dakin's solution and wait forty-eight to seventy-two hours until the swelling and edema of these tissues have disappeared. I am surprised to find that so much of the tissue that I would have removed if I did an immediate debridement has become vitalized and closure can be made much easier than if I had cut away this tissue and made an immediate closure.

Dr. William H. Maley, Galesburg: According to Dr. Koch's paper, I think we have wasted a lot of time in laparotomy operations and putting on rubber gloves, when we might have used soap and water. This is a blow to the manufacturing druggists who make mercurochrome and iodine. However, mercurochrome has no place in my practice. I can remember Dr. Edward Ochsner thirty years ago was one of the first to come before this Society to introduce iodine for the cleansing and preparation of such wounds. I have always been a strong advocate of the use of iodine and I still stick to it. If we have no use for iodine in compound injuries we certainly have no use for it on the clean abdomen upon which we are going to operate. If we have an emergency accident—a limb rolled in the dirt of the street and run over and crushed—I still think iodine will do far more to save such a wound than soap and water, much as I think of soap and water.

Dr. Sumner L. Koch, Chicago (closing): Dr. Lewis is entirely correct in saying that we should not claim too much credit if after we carefully cleanse a contaminated wound with soap and water and close it the wound heals by primary union. The one thing for which we can claim credit is not adding injury, chemical or mechanical, to that which has already taken place. Normal tissues have considerable vitality. If we are careful not to add further injury by our surgical treatment we are doing much for our patient.

Soap and water constitute the most effective agent at our command which acts as a solvent of dirt and grease, and which does not injure living tissue. That is why we have used it for so many years to cleanse the surfaces of our bodies. Is it not entirely logical then to use it in cleansing those deeper tissues exposed in open wounds which have not the resistance to trauma that the covering tissues have acquired?

I do not know that it makes much difference what kind of soap one uses. In our own work we use ordinary green soap well diluted with sterile water.

Immobilization, as Dr. Lewis has emphasized, is a very helpful adjunct in the treatment of compound injuries even though no bone injury has taken place.

We always give tetanus antitoxin if there is any question as to the likelihood of infection with tetanus bacilli.

I cannot speak with authority on the question of anti-gas gangrene serum. Men in whom I have confidence say the titer of the commercial sera available is so low that it is impossible to believe that the administration of 100 c. cm. of anti-gas gangrene serum can have much effect if gas gangrene is present. During the war surgeons day after day saw wounds infected with the organisms of gas gangrene. The patients recovered if the surgical treatment was adequate and carried out promptly after the first symptoms of infection appeared. Such infection, of course, develops from time to time in civil practice. The best prophylaxis, in addition to a well performed primary operation, and by that we mean careful cleansing plus complete excision of devitalized tissue, is repeated examination of the wound area. If symptoms of gas gangrene appear wide opening of the wound, excision of involved muscle tissue, and the efficient use of Dakin's solution after operation should bring about a satisfactory result.

I believe Dr. Maley has expressed my viewpoint pretty well. We would give up antiseptics as they are generally used in the immediate treatment of injuries and substitute "aseptic surgery" for "antiseptic surgery." And if instead of using tincture of iodine in the preparation of the operative field he will have the part carefully washed with soap and water the evening before operation, covered with a sterile dressing and a binder or bandage to hold the dressing in place until the patient reaches the operating room, and if in the operating room he will have the operative field again gently cleansed with soap and water I venture to predict that the incidence of wound infections and stitch abscesses will be kept at a minimum.

When Dr. O'Byrne took the piece of skin that the patient produced from his pocket, carefully cleansed it and sutured it accurately over the finger from which it had been torn he was doing a wise thing. He was applying an autogenous skin graft over the raw surface and transforming the open wound into a closed wound.

I told you of a patient in whom the skin and subcutaneous tissue were torn away from the dorsum of the forearm except for a narrow distal pedicle. The entire flap became necrotic, both because of infection and because the skin and subcutaneous tissue had been torn from the source of their blood supply. If the subcutaneous tissue had been carefully dissected away from the flap and the flap thus converted into a full thickness skin graft; and if after wound cleansing as described above had been accomplished this graft had been accurately sutured in place and held with a pressure dressing I believe the result would have been identical with that which Dr. O'Bryne obtained in his case.

Dr. Mock brought up the question of crushing injuries. I excepted that type of case from those under discussion because it is very difficult to tell immediately after a crushing injury how much of the injured tissue will live. Our experience has been quite opposite to his. In certain cases of crushing injury we have thought that tissue close to the wound looked viable

and so have treated it conservatively. Twenty-four hours later we have found the same tissue becoming cyanotic, and in another twenty-four hours it has become gangrenous. In the first case described, however, we thought we could tell how much tissue had been hopelessly crushed because it was white and insensitive. We cut away the crushed tissue and immediately covered the raw surface with a full thickness graft, with the result which you have seen.

SPINAL ANESTHESIA

W. L. WANER, M. D.
EVANSTON, ILL.

Spinal anesthesia during the past few years has become a standardized procedure in practically all of the large hospitals throughout this country and abroad. This presentation on spinal anesthesia is based on a study of 382 consecutive spinal anesthetics administered by the speaker during the past five years, in the St. Francis Hospital at Evanston. This institution, the eighth largest in the Chicago district, rating based on the total number of patients admitted during 1933, is a general hospital with no free beds; consequently, all of the spinal anesthesias in this series were administered to private patients.

Our staff is composed chiefly of men doing general practice. The majority of these men have found occasion to use this type of anesthesia with gradually increasing frequency. About twelve per cent. of our major surgery is done with spinal anesthesia. We have been rather conservative in its use and as a rule do not use it in ordinary cases in which there is no particular danger attached to general anesthesia. We have used spinal anesthesia in all operations below the diaphragm and in particular when a general anesthetic was contraindicated. We have found it to be of especial value in tuberculosis, in biliary tract surgery with liver damage, in urinary tract surgery with kidney damage, in certain cardiac conditions, in respiratory tract infections requiring abdominal surgery. We have performed under spinal anesthesia gastric resections, gastroenterostomies, gastrostomies, colostomies, resection of the rectum for carcinoma, and amputations of the inferior extremities, especially in diabetic patients. We find it the ideal anesthetic in cases of intestinal obstruction. In this last condition, under spinal anesthesia, the relaxed abdominal wall may be lifted from the viscera and the abdominal cavity inspected. Often the involved area can be seen and located without traumatizing the bowel. One does not have the "boiling out" of the intestinal tract such as occurs frequently under general anesthesia with its attendant shock. In the words of Frank Martin of Boston[1] "the only contraindication in the use of spinal anesthesia, in properly selected cases, is ignorance or inexperience." He is indeed fortunate who does not experience serious difficulty sometime during the course of his first fifty administrations.

As a result of our successes with bad risk patients we are now using subarachnoid block more frequently with the better risk patient. In 1933 we used 32% more than in 1932. Statistics from our large hospitals and clinical centers show a progressive use of spinal anesthesia. It would seem that in institutions where the procedure has fallen into disrepute the difficulty lay not with the method but in errors of judgment in choice of patients and in errors of technique in its administration. For success in subarachnoid block a definite and precise technique is necessary. Most painstaking care must be exercised in choosing the amount of drug to be used, the location of the site of the puncture, the amount of dilution employed, and the height of anesthesia obtained. During the past four years we have employed novocaine crystals as our anesthetic agent in nearly all instances. We have had no fatalities attributed to this agent during this period.

Tuberculosis. We have experienced most gratifying results in the use of spinal anesthesia in tuberculous patients requiring surgery below the diaphragm. We have performed nephrectomies, salpingectomies, and laparotomies without disturbing the pulmonary system. Very recently we had a patient aged forty-eight years suffering from active pulmonary tuberculosis with a marked laryngeal involvement which was so painful that he refused to take fluids or food by mouth. A Spivack gastrostomy was performed with ease under spinal anesthesia and he had an uneventful postoperative course with steady improvement to date. Another patient aged twenty-eight, a member of our Sisterhood, during the course of an active pulmonary tuberculosis

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developed an acute appendicitis. The appendix was removed under spinal anesthesia and exploration of the abdomen revealed a tuberculous peritonitis. This patient made an excellent recovery.

Biliary System. Biliary tract surgery is one of the most dangerous operations that the surgeon is called upon to perform in the abdomen. All of the help available should be employed in dealing with this difficult problem. With spinal anesthesia gall bladder surgery often is performed with great ease. In addition to ease in the operative procedure shock is minimized. The anesthetic does not damage the liver, and the immediate postoperative course is much smoother than under general anesthesia. In our bad risk patients undergoing surgery of the biliary tract, we employ veneclysis of 5% glucose during the operation and subsequently. With this procedure we can usually control the blood pressure and maintain liver function. During the past three and one-half years we have had no deaths from gall bladder surgery performed under spinal anesthesia. Our mortality under general anesthesia has been eight per cent. We have had 119 patients operated upon for disease of the biliary system during the past three years. Twenty-five patients, or 21% of this series were operated upon under spinal anesthesia. All of these cases recovered. As previously stated we have used spinal anesthesia as a rule only when dealing with difficult cases or when there was contraindication for general anesthesia. Several of these patients were very poor surgical risks.

1. A man aged 54 was operated upon for a common duct stone. He was markedly jaundiced and running a fever. He had had a cholecystotomy on two previous occasions. He had a mild nephritis and a hypertension. The blood pressure was 190/100. The patient was operated upon under spinal anesthesia concurrently with intravenous drip of 5% glucose in buffer solution. Marked relaxation was obtained, the common duct identified, opened and the stone removed, which relieved the obstruction. A T-tube was placed into the common duct. We were able to maintain the blood pressure between 180 and 190 throughout the operation except for a period of about five minutes during which time the pressure fell to 140 but was brought up to 180 by increasing the rate of flow of the veneclysis. The patient left the operating room draining golden yellow bile from the T-tube, which means to us that his liver function had been maintained throughout the operation. The patient made an unusually smooth convalescence and was discharged from the hospital on the eleventh post-operative day.

2. Another patient was a man age sixty-four operated upon for empyema of the gall bladder. He had a bad cardiac condition and had suffered many attacks of severe angina pectoris. At the time of operation his fever was 102.4 and his pulse 140. The blood pressure was 90/60. He was given veneclysis of 5% glucose and then spinal anesthesia. The gall bladder had perforated. It was removed and two Penrose drains inserted through a stab wound in Morrison's pouch. This patient recovered and was discharged on the thirty-second post-operative day. He had no anginal attacks until after returning home. An attack occurred the day he received the surgeon's bill.

3. A young matron, aged twenty-three, entered the hospital suffering from an acute empyema of the gall bladder. Her temperature was 103 and the pulse 160. She was given veneclysis of 5% glucose and cholecystectomy performed under spinal anesthesia. The blood pressure was maintained at 120 systolic throughout the operation. This patient made a good recovery and was discharged on the thirteenth post-operative day.

We had no post-operative cases of pneumonia, atelectasis, or pulmonary infraction develop following spinal anesthesia in the series. Under general anesthesia we have been less fortunate. Several years ago in order to cut down the morbidity rate of pulmonary complications following general anesthesia, we began hyperventilation of our patients with carbon dioxide at the end of the operation and every four hours for the following two days. The same procedure has been used routinely with high spinal anesthesia. This may account, in part, for our good fortune; but the maintenance of the blood pressure during and after the spinal anesthesia is probably the more important factor.

Genito-Urinary Surgery. This offers one of the best fields for spinal anesthesia. Cystotomies and prostatectomies are performed with small doses. But care must be exercised in those elderly patients with diseased myocardia. Occa-

sionally they will manifest a post-operative reaction, occurring early, with lowering of blood pressure which may be due to shock or a myocardium affected by the anesthetic agent. We have found that this type of patient whether genito-urinary or another type of surgical case requires careful post-operative watching, frequent blood pressure readings and early administration of veneclysis if the pressure fall below normal limits. These patients stand anoxemia resulting from low blood pressure very poorly. Recently, under spinal anesthesia a patient age sixty-four had a vesical neck resection of the prostate, bilateral vasectomy, and an Andrew's operation for hydrococle. 100 mg. of novocain were used and the operating room procedures were very smooth and uneventful. The anesthesia was below the umbilicus and no fall in blood pressure occurred. However, about four hours post-operatively the patient's blood pressure dropped very low with all the manifestation of shock. Veneclysis was instituted and the patient was out of danger in a few hours. Experience has taught us to be on our guard for post-operative collapse in elderly patients even when the surgery performed has not been extensive.

Congestive Heart Failure. Major surgery in cases of congestive heart failure tax the ingenuity of the surgeon to the utmost. These patients stand anesthesia and surgery very poorly. In three cases of congestive heart failure we have successfully employed spinal anesthesia. The first patient was a woman aged forty-nine who entered the hospital in a pitiful condition. She had a strangulated femoral hernia of twelve hours duration which was causing her intense pain. She was in a state of marked cardiac decompensation and had been so for a period of months, necessitating a sitting posture. She was cyanosed, dyspneic, coughing and overweight. Her tissues were edematous up to the costal margin. In desperation it was decided to attempt to give her relief. She was given a low spinal anesthetic while sitting on the edge of the operating table. In about ten minutes after the spinal anesthesia was given we were able to get the patient level on the table. The blood pressure which had been 105 at the beginning arose to 110 during the operation and remained at that level. The patient volunteered the statement that she was more comfortable and could breathe better during the operation than she had been able to do for months. The obstruction was readily relieved and the patient returned to bed in remarkably good condition. The case has furnished much speculation regarding the effect of spinal anesthesia on the adrenal glands and the so-called[2] "drive of the adrenals on the thyroid" so frequently spoken of by Crile of Cleveland; also, the recent work of Blumgart and Levine[3] in total thyroidectomy in cases of hopeless congestive heart failure would explain the apparent ease with which these patients withstand spinal anesthesia. Two other patients were operated upon with congestive heart failure in our series; these were for cesarean section. Both of these cases withstood the surgery quite well.

Cesarean Section Surgery. In cesarean section cases which are elected only after the patient has gone through the test of labor and has become exhausted, spinal anesthesia offers an interesting place in surgery. These patients exhausted from their long labor are poor subjects for a stimulating general anesthetic. An already tired-out heart under general anesthesia will be further exhausted so that when the operation is ended there remains little reserve and the patient is sent back to her bed to take up the struggle with her fighting power spent. The same patient under spinal anesthesia will require a surprisingly small dose of the anesthetic agent in her tired condition. She will actually rest during the operation, her pulse will slow, she will be serene, and afterwards will remark about the wonderful rest which she had enjoyed during the operation. This patient returns to her room rested and in good condition to take up the post-operative struggle.

Sensitive and Hyposensitive Patients. Among the contraindications for spinal anesthesia has been the hypersensitive, excitable, nervous individual. Recently we have been arbitrarily classifying all of our cases into two groups; the sensitive, and the hyposensitive. The hyposensitive, easy-going, tranquil type is the ideal subject for spinal anesthesia. The high-strung, nervous, sensitive type is the difficult one to control. We have found through the use of proper sedation that we can convert most of the sensitive group into the hyposensitive. We have employed pentobarbital sodium routinely for the past three years and find it a very satisfactory

sedative. Routinely patients received gr. one and one-half sodium pentobarbital at bedtime. If there is no reaction from this dose three gr. are given three-quarters of an hour before operation for the sensitive and one and one-half gr. for the hyposensitive. With this procedure the nervous patient, whom we often consider an unfit subject for subarachnoid block, will become a willing and co-operative individual. As a rule I object to the use of morphine as a sedative in deliberate surgery cases. Frequently, it causes vomiting during the operation. With the use of sodium pentobarbital and the maintenance of blood pressure, vomiting under spinal anesthesia occurs infrequently.

Complications of Spinal Anesthesia. The two alarming complications of spinal anesthesia are vasomotor collapse and respiratory failure. In our early cases with spinocain as the anesthetic agent we experienced these complications several times. During the past four years we have been using novocain crystals dissolved in spinal fluid to make a five per cent. solution and injecting without barbatage. We have had no serious difficulty during this time. We employ ephedrin, in small doses, before and during the anesthesia if necessary, to help maintain the blood pressure. When we anticipate vasomotor collapse as in a poor risk patient, or when a high spinal anesthesia is to be given, we have found that intravenous drip of five per cent. glucose has invariably maintained the blood pressure at a safe level. I have had no respiratory involvement except in my early cases when the blood pressure fell to an alarming extent. Apparently, respiratory failure is secondary to vasomotor collapse, and is probably due to bulbar anemia. The Trendelenburg position has been of great value to us in preventing bulbar anemia.

Post-spinal complications in our series have been headaches and nerve injuries. Our early cases showed about five per cent, post-operative headaches. This has been reduced to about one per cent. by improvement in technique. The correct technique demands that the needle pierce the dura in such a manner as to prevent leakage of spinal fluid. The fibers of a dura run parallel to the long axis of the body—the bevel of the needle should separate these fibers and not cut them at right angles. This can be accomplished by introducing the needle with the bevel parallel with the fibers of the dura. Also, fibers of the dura are usually in a state of tension—if the fibers are cut crosswise a gap is opened—if the fibers are merely separated they tend to close tightly. The loud "pop" of lumbar puncture as the needle cuts across the fibers of the dura are seldom heard when good technique prevails.

We have had nerve injuries in about one per cent. of our cases. The first accident involved the medial plantar nerve. The foot remained sensitive to touch for about one month and then cleared up. The lateral cutaneous nerve of the thigh was involved in one case but gave little difficulty. The third patient complained of intermittent pain in the calf of one leg for about ten days. These injuries are probably due to spearing a nerve trunk by introducing the needle too far into the spinal canal. The noiseless puncture means cautious proceeding with frequent removal of the stilet. The first nerve injury occurred at about the time we ceased getting post-operative headaches. The noiseless puncture sometimes makes it difficult to determine when the needle has entered the spinal canal. It is better to proceed very cautiously and frequently remove the stilet when in doubt. It certainly was not a pleasant experience to trade a headache for a nerve injury. All of the patients with nerve injury recovered within four weeks.

CONCLUSIONS

1. Spinal anesthesia in carefully selected cases and with proper technique may be safely employed in surgical procedures below the diaphragm.
2. Spinal anesthesia in our series of cases has been a factor in decreasing the mortality rate in surgery of the biliary tract.
3. Veneclysis has been a decided help in maintaining the blood pressure of patients undergoing high abdominal surgery while under spinal anesthesia.
4. Improvement of technique has decreased post-operative complications.
5. Proper sedation has increased the range of patients fitted for spinal anesthesia.
6. Some patients suffering with congestive heart failure can be successfully operated upon under spinal anesthesia.

7. Genitourinary surgery can be performed almost routinely with spinal anesthesia.

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DISCUSSION

Dr. Amos Fey, Galesburg: The most important part of any discussion on spinal anesthesia is the question of safety. Many times I have asked surgeons for whose judgment I have a great deal of respect, if they used spinal and they have replied, they were afraid to use it because they have had deaths in the hospital. Many of the enthusiasts on spinal anesthesia consider vasomotor collapse in a very light manner. I recently had a patient whose blood pressure dropped from 265 to 85 on the table. When a patient has that sort of occurrence, it really seems to me something for the surgeon to be concerned about. When they go into this work the safeguards that are necessary must be used. I believe occasionally a patient will have a drop in blood pressure with a rather low level spinal anesthesia. I have seen patients with spinal anesthesia below the umbilicus have a marked fall in blood pressure.

In discussing this question of the effect on the blood pressure it is necessary to know just exactly what happens when a patient has spinal anesthesia. This is probably familiar ground to those who use it. The anesthesia paralyzes the vasoconstrictors of the anterior roots and the patients do not get enough blood into the heart. Secondarily, they get cerebral anemia, and as Dr. Waner says, respiratory paralysis is secondary to anemia and not the result of the anesthetic, and this is borne out clinically. Years before spinal anesthesia became popular, Jonnesco used it in operations on the neck and head, proving that the anesthetic can reach the medulla without causing respiratory paralysis.

We have used the Pitkin technic not because it is better than novocain crystals but because it has been better popularized. It is well to have expert instruction when one uses spinal anesthesia only occasionally. There are a few things I would advise to one who uses it only occasionally. First, take frequent blood pressure readings. If that is neglected you will not realize why collapse occurs, what the symptoms are due to, or how to treat them. Another point, in every spinal anesthesia test the height of the anesthesia with an Allis forceps. That is an easy thing to do. When the anesthetic is working well we forget how much novocain we have given the patient. I have been surprised to find we frequently give a good deal more anesthetic than necessary. The duration of the anesthetic should also be checked in every case.

Another important point is to keep the patient in the Trendelenburg position until he gets back to his room.

In conclusion, I feel that enthusiasts over spinal anesthesia overlook other anesthetics which will serve just as well. There is no reason for a patient to have spinal anesthesia in urological surgery when a caudal anesthetic will do just as well. The same is true in thyroidectomy. Why one should want to give a spinal anesthetic in goiter surgery, as a few enthusiasts advocate, when an inhalation anesthetic can be given with less danger is difficult to understand.

Dr. O. L. Zelle, Springfield: Spinal anesthesia contracts the bowels and is contraindicated in cases of acute appendicitis with perforation or any suspected perforation of the bowel.

Lower blood pressure is to be expected in spinal anesthesia. The vasomotor constrictors are temporarily severed, for that reason the injection of any drug to increase the blood pressure is contraindicated. In genitourinary surgery in a series of one hundred cases we have used spinal anesthesia in but two. All this work is done under transsacral block.

The height of anesthesia depends entirely upon the way the drug is injected. The amount of neocaine used depends upon the weight of the patient and the length of the anesthesia. The age at which spinal anesthesia can be done depends entirely upon the skill of the operator. Scopolamin and morphine are given one-half hour before the operation. The barbital groups have proven unsatisfactory. I am very particular about having the patient in the Trendelenburg position and keeping this position for six hours after the operation. Spinal anesthesia is replacing the other types of local anesthesia which is a mistake. Dr. Fey spoke of spinal anesthesia in thyroid surgery; this is another case where spinal anesthesia is replacing other forms of local anesthesia. Blocking the cervical nerves as they emerge from the transverse processes is the ideal local anesthesia.

I have always one contraindication for spinal anesthesia—myocardial degeneration or extreme high or low blood pressure. It is much better to replace this form of anesthesia by doing a field block or some other form of local anesthesia.

Dr. J. Davies, Springfield: Spinal anesthesia is of value and should be given more attention. Those who are opposed to it take an arbitrary stand.

Dr. S. L. Governale, Chicago: Eight per cent mortality in biliary surgery seems to be an exceedingly high morbidity with any type of anesthesia. From personal observation and available statistical data, one learns that the mortality of cholecystectomy is about 2.5% regardless of the anesthetic agent employed. Although I am an enthusiastic advocator of spinal anesthesia, I cannot concur with the essayist in that he is able to reduce the mortality of biliary surgery from eight per cent to not even a single fatality.

However, I do agree with Dr. Waner that spinal anesthesia has reduced the morbidity concomitant with diabetic surgery; the latter is especially true in the presence of insufficiency hepatitis.

In regard to the technique and minutiae of spinal anesthesia, it suffices to say that any one who is adept in performing lumbar puncture, should be competent to

inject 2-3cc. of Spinocaine solution in the culdesac of the spinal canal.

I am not in full agreement with the essayist in his views pertaining to the reduction of pulmonary complications by the use of spinal anesthesia. I have seen three cases of postanesthetic pulmonary complications; namely, one is that of pulmonary collapse and two were pulmonary infarcts. We have seen a few isolated cases of terminal bronchopneumonia at autopsy.

In closing I should like to hear Dr. Waner's opinion concerning the occasional failure of effecting a complete anesthesia of the peripheral sensory elements with a simultaneous total ablation of the motor impulses of the spinal cord.

Dr. W. L. Waner, Evanston (closing): Our greatest concern with spinal anesthesia has been the maintenance of blood pressure. I do not agree that blood pressure in spinal anesthesia can drop to a low point and be safely permitted to remain there. We have had dangerously low drops in blood pressure using spinocain as the anesthetic agent; rarely have we had marked drop in blood pressure while using novocain crystals. This, I believe, is due to the fact that I have been able to control the height of anesthesia while using the novocain crystals. This is accomplished in two ways: first, choosing the proper interspace depending on the height of anesthesia desired; second, injection without barbotage. For instance, the first lumbar interspace is chosen for gall-bladder operations, 150 mg. of novocain crystals are dissolved in three cc of spinal fluid. This solution is then injected at the rate of one-half cc per second, without barbotage. The patient is then immediately placed level on the table and not changed to Trendelenburg unless the blood pressure falls more than ten points. Maintenance of blood pressure gave me the greatest trouble in the early use of spinal anesthesia while using spinocain. I have not used this anesthetic agent during the past three and a half years.

Our experience with veneclysis leads us to believe that it does aid materially in maintaining blood pressure of patients under spinal anesthesia. Of course, if the anesthesia has gotten out of control and one has anesthesia to the ears with inability to get a blood pressure reading, with pooling of blood in the splanchnic area, the only thing I know of that is of avail is a marked Trendelenburg position. However, the blood pressure should never be permitted to go down and down and down. The reading should be taken at least every five minutes and with any fall below ten or fifteen points immediate measures should be instituted to prevent further drop. I find ephedrin valuable in helping to maintain blood pressure. I use fifty mg. as a rule before starting the spinal puncture. I repeat the dose once if there is a fall in pressure during the operation. I do not use large doses because I believe that large doses have an untoward effect on the heart.

The question of mortality in biliary tract surgery in our hospital was raised by one of the discussants. It must be borne in mind that our hospital is an open one; we have about fifty staff members and an equally large number of visiting doctors. If a visiting doctor operates in a gall-bladder case for the first time and the case terminates fatally it affects our mortality rate considerably. We have had two such instances in the series reported. Also, the eight per cent figure is for general anesthesia; our general mortality of course is not that high because there were twenty-five cases without a fatality operated upon under spinal anesthesia. Of course a mortality above five per cent is high. But Frank Lahey reported in 1933 that at the Lahey Clinic in Boston they had reduced their biliary tract surgery mortality from about five per cent up to 1927 to about 1.5 per cent since 1927. Among the factors responsible for this improvement, according to Lahey, were earlier recognition of disease, better operative risks, improved technique, and spinal anesthesia. This author recommends spinal anesthesia as the anesthetic of choice in biliary tract surgery.

I do not maintain that spinal anesthesia will reduce gall-bladder surgery mortality to nil. That would be ridiculous. No anesthesia can replace good preparation of the patient, good surgery and post-operative care. But it is a matter of our hospital records that we had a series of twenty-five cases with novocain spinal anesthesia without a single mortality during a three-year period. This was, of course, exclusive of malignancy.

My idea of biliary tract surgery mortality in leading medical centers in this country and abroad during the past ten years based upon a study of some 36,000 cases would indicate an average death rate of about 6.5 per cent. This should answer the question of general mortality. Cholecystectomy, of course, carries a much lower mortality.

I wonder if the discussant who thinks anyone adept at doing a lumbar puncture can give a spinal anesthetic would be willing to submit himself into the hands of such an individual.

One discussant asked for an explanation of why we sometimes get marked muscular relaxation without complete sensory nerve block. I think the explanation is on the basis of specific gravity of the spinal fluid and the anesthetic agent mixture. If the patient is placed in a supine position immediately after the anesthetic agent is injected and the mixture is lighter than the spinal fluid it floats to the top and only the motor roots are well anesthetized. If the patient is first placed in the prone position for a few minutes under these conditions, good sensory anesthesia will be obtained.

Just one other remark about spinal anesthesia and blood pressure: I do not think the anesthetic agent should ever extend higher than the fourth thoracic nerve. I never like to have anesthesia above the nipple line under any circumstances. I would rather suffer a five per cent failure than to get too high a spinal anesthesia with its attendant danger.

In closing I wish to express my appreciation and gratitude toward my fellow staff members and the Sisters of St. Francis Hospital whose fine cooperation has made this study of spinal anesthesia possible. If the speaker has brought forward anything which will aid others in the handling of spinal anesthesia, he feels he has been well repaid for his efforts.

ACUTE INTESTINAL OBSTRUCTION. ITS EARLY RECOGNITION

EARLE I. GREENE, M.D., F.A.C.S.
AND
J. MAJOR GREENE, S.B., M.D.
CHICAGO

Whereas in most acute abdominal catastrophies the mortality and morbidity have rapidly fallen, in acute intestinal obstruction the mortality has changed little from that of forty years ago. The importance of early recognition of any acute abdominal catastrophy requiring early intervention is generally recognized. Also, it is an accepted fact that there exists a very definite correlation between the ultimate mortality figure and the time intervening between the onset of the disaster and the institution of adequate treatment. Acute intestinal obstruction is no exception to this rule. If all of us were to become "obstruction minded" and at all times keep a few pertinent facts in our minds, the unwarranted mortality could be appreciably reduced.

Several factors are responsible for the delay in recognizing cases of acute intestinal obstruction at an early period.

1. The prevalent teaching that acute intestinal obstruction is accompanied by obstipation and tympanites.

2. The general belief that the passing of fecal material or gas after an enema precludes an obstruction of the bowel.

3. The unfortunate but too frequent usage of narcotics.

4. The absence, early in the disease, of physical findings.

The occurrence of crampy intermittent colicy pains, often called "gas pains" by the patient, coming on at frequent intervals accompanied by nausea and vomiting must always be considered in the light of a possible case of intestinal obstruction. These symptoms become especially significant if such a patient had previously been operated upon. "Gas pains" a few days after an operation or many years later may mean the onset of an acute obstruction and must never be dismissed too lightly.

The vomiting in an early case is not of the projectile type, is not regurgitant in character, but is reflex. It is similar to that seen in ruptured ectopic pregnancy, twisted ovarian cyst or acute appendicitis.

If we are to recognize these cases early we must remember that obstipation and tympanites are late manifestations. Meteorism and complete obstipation spell delay. These symptoms must and will appear at some time during the course of an intestinal obstruction but usually at a time too late to offer the patient early remedial help.

Another unfortunate fact which must always be borne in mind, if we are to succeed in recognizing these cases early, is that when an obstruction to the flow of material through the bowel takes place no physical findings are found. There is no local tenderness. There are no masses unless the obstruction takes place in one of the hernial openings. There is no rigidity. There is no rebound tenderness. In practically every other intra-abdominal catastrophy there is some telltale evidence denoting the presence of a lesion within the abdominal cavity. Rigidity, tenderness, rebound tenderness may usually be elicited, but in an early case of acute intestinal obstruction this is not true. When seen early the general condition of the patient is not altered. There is no change in the blood chemistry, there is no increase in temperature, the pulse rate is normal, there is no change in the leucocyte count unless there has been considerable vomiting resulting in dehydration at which time the leucocyte count will rise. Should, however, a strangulation accompany the obstruction the picture changes. Local and general manifestations may then become quite a prominent part of the picture. A patient presenting intermittent crampy colicy pain with nausea and vomiting without manifesting local tenderness should be suspected of having a simple intestinal obstruction.

The stethoscope is a most important adjunct in the early recognition of this condition. The finding of loud intestinal sounds, reaching their maximum at the height of the pain, often explosive in character, suggests most strongly that an obstruction to the flow of material through the bowel is present. Although some increase in intestinal sounds may be heard in other colics or acute abdominal lesions, there is never the definite relationship between the borborygmi and the acme of the pain as occurs in an obstruction to the bowel. Intermittent attacks of crampy colicy pains, accompanied by nausea and vomiting,

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without local findings, with loud intestinal sounds concomitant with the pain and reaching their maximum at the height of the pain is most suggestive of acute intestinal obstruction.

Another time worn theory which must be exploded if we are to make an early diagnosis is the appreciation that gas and fecal material may be passed successfully after an enema has been given even though an acute obstruction is present. Many lives have been sacrificed because too much reliance has been placed on the passing of a little gas, leading the physician to feel that no obstruction is present. The bowel distal to the obstruction is anatomically and physiologically normal and as long as gas or fecal material is present so long will this material be passed. Obstipation will occur, but like meteorism is a late manifestation.

The use of narcotics in any acute abdominal catastrophy must be deprecated. The masking of symptoms, the delay of a few hours after giving a narcotic is often enough to change the entire complexion of a given case. Unless the diagnosis has been definitely established the use of any narcotic is not justifiable.

The x-ray is one of the most important adjuncts we have at our command in aiding us to arrive at an early diagnosis in this most serious condition. Though gas is normally present in the alimentary tract, it is seen on an x-ray film only in the stomach and colon. The presence of gas in the small intestines in an adult is an abnormal finding and is indicative of an obstruction to the bowel. Within four hours after an obstruction takes place gas may be detected in the small bowel. Little preparation is necessary in taking such a film. Barium should not be used. A flat plate of the abdomen in the supine and standing position will usually give the necessary information. A collection of gas occupying a central position, its long axis in the transverse position, giving a step ladder like appearance is pathognomonic. At times fluid levels with gas above may be seen. In small bowel obstruction haustral markings are absent while the valvulae conniventes stand out prominently giving a "herring bone" pattern.

Finally, any patient, especially one who has previously had an abdominal operation, who complains of intermittent attacks of crampy abdominal pain, accompanied by nausea and vomiting, without local findings, with loud intestinal sounds concomitant with the pain and reaching their maximum at the acme of the pain, who has or has not passed gas or fecal material after an enema and who on an x-ray film of the abdomen presents evidence of gas in the small intestines—such a patient has an acute intestinal obstruction.

310 S. Michigan Avenue.

DISCUSSION

Dr. J. Major Greene, Chicago: I wish to urge the more frequent use of the x-ray in the early diagnosis of acute intestinal obstruction. When we realize that within a few hours after an acute intestinal obstruction has taken place, we can find gas in the small bowel we have something that can really help us in the early recognition of acute intestinal obstruction. If acute intestinal obstruction is neglected, the patient gets into a condition in which the mortality rises tremendously. In the neglected case of acute intestinal obstruction strangulation may occur. In early acute intestinal obstruction all we have is a blockage of the bowel, but in acute strangulation we have an interference of the blood supply leading to the possibility of gangrene of the bowel. Operating on a simple intestinal obstruction is relatively simple with a low mortality, whereas, with strangulation the mortality rises tremendously because of the frequent necessity of doing resections of the involved portion of the bowel.

We have a simple and beneficial method for the treatment of the early case of acute intestinal obstruction which may save an operative procedure. The Levine tube with constant suction may in many cases of simple obstruction save an operation. The patient with strangulation will give symptoms of acute obstruction plus other findings. Because of the hemorrhagic discharge into the peritoneal cavity we have findings of tenderness, rigidity, rise in pulse rate, increase in temperature and all the symptoms of a very acute abdominal catastrophy. The early recognition of acute intestinal obstruction means a very low mortality, whereas the late recognition means a very high mortality.

Dr. William R. Cubbins, Chicago: I want to congratulate Dr. Greene on the conciseness of his paper and for stressing the absolute necessity of an immediate operation, particularly in those cases where there is a partial obstruction. A partial obstruction can be relieved with practically no mortality, but as soon as a complete obstruction occurs and endures for a while, the mortality jumps anywhere from 5% to 50%. When we are forced to make a resection, we may assume a mortality of 50%, if it is correctly and rapidly done, without permitting the bowels to eviscerate. An evisceration of any type which allows the blood in the bowel wall to cool is followed by shock, which in itself may be fatal. I doubt very much if one can make a differential diagnosis of obstruction of the bowel by a band as opposed to a loop of bowel that is strangulated. Distention of the bowel distal to the obstruction has not been observed in my experience. It is always the

bowel proximal to the obstruction that is red, swollen and friable. The bowel will empty itself distal to the obstruction. There is no doubt in my mind that lead poisoning, locomotor ataxia or tabes can cause a spasm of a certain portion of the bowel, with some distention proximal to that spot in which the spasm has occurred. However, the distention of the proximal bowel in any of these types never reaches that degree that is observed with a mechanical obstruction. I wish to say again that Dr. Greene is to be congratulated for urging early operative attack upon an obstructed bowel.

Dr. Amos Fey, Galesburg: There is no difference in the physical findings of late so-called simple intestinal obstruction and strangulation. The first discussor mentioned that strangulation damages the blood supply of the bowel. This also occurs in late "simple" obstruction from distention. If we attempt to differentiate too finely between these two types of obstruction we are going to allow simple obstruction to go to the stage of strangulation, or to marked distention and paralysis.

As to the mortality of enterostomy, in a series of cases at the Cook County Hospital the mortality was about 85 per cent. That was due, it seemed in these clinical records, to the fact that the paralyzed bowel was not able to empty through the enterostomy. Our only chance of avoiding this high mortality is not in doing the enterostomy, but in getting the patient operated on at a time when the bowel is healthy enough to preserve its function.

Dr. R. K. Packard, Chicago: I would like to call to your attention one sign which I think is very valuable in addition to the splendid presentation here given. Sometimes we see these cases in the middle of the night in a hospital where it is not easy to get the x-ray department out to make a picture. If one will observe very carefully, you very frequently see a definite rise at the end of the obstruction by a peristaltic wave. Sometimes it takes considerable time. It is particularly applicable in thin people where peristalsis is active. We have watched some of these patients as long as a half hour in order to find that sign. When we find that sign we believe it is a very definite diagnostic sign. I believe it is one of the important signs that should not be forgotten in the diagnosis of intestinal obstruction.

Dr. Harry E. Mock, Chicago: I want to call attention to three cases with 100 per cent. mortality. They were cases where a portion of the small intestine got into the femoral ring causing necrosis. The symptoms were obscure and gradual in development, but suddenly changed into a very acute toxemia. One patient died without operation and at autopsy we found a portion of the intestinal circumference in the femoral ring, necrotic. The other two were operated on and showed a necrotic portion of the gut wall in the hernial ring.

Dr. Charles C. O'Byrne, Chicago: I remember well a girl I operated upon. I was called to see her on Tuesday evening. She had been riding a motorcycle on Sunday. On Monday after luncheon she vomited. She did not go to work on Tuesday, and that night I was called. She was lying flat in bed, with absolutely no fever, tenderness or distention. On going over the abdomen carefully, just about midway between the umbilicus and the gallbladder there was one point where there was slight tenderness. She was given an enema with fair result. I was about to leave, without making a diagnosis, when the girl asked for a drink of water. She drank it and it came up immediately. She said, "That is what I have been doing all day." I took her to the hospital and opened the abdomen and there was a complete obstruction by a band of adhesions clear across the bowel and attached to the mesentery on that side. It was about the size of a lead pencil. The abdomen was perfectly clean. When she abstained from food or drink she was perfectly comfortable, but when she took anything into the stomach it immediately came back.

Dr. Earl I. Greene, Chicago: I would like to say one thing regarding food poisoning and some of the other colics. They will give pain and colic but if you will use the stethoscope you will find that the increase in the peristaltic waves does not come at the height of the patient's pain. They will have pain it is true, but that concomitant factor, the hyper-exaggerated peristaltic signs coming at the acme of the pain, is absent and will aid in the diagnosis as to whether it is food poisoning, lead poisoning or some other disease associated with colic.

So-called simple obstructions very frequently go into strangulation. The distention, edema and gradually a shutting off of the blood supply lead to gangrene.

Concerning the so-called peristaltic waves that one can see in a case of acute intestinal obstruction, this is very common and very characteristic in low grade chronic intestinal obstruction. It is very common in obstruction of the colon. In obstruction of the small bowel it is rather unusual to find demonstrable peristaltic waves. If they do occur it aids in the diagnosis.

Dr. O'Byrne has probably had many other cases similar to the one he described. Concerning Dr. Mock's case of Richter's hernia, the fact that a portion of the bowel was caught in the ring but did not produce a complete intestinal obstruction explains itself because there was never at the time a complete intestinal blockade. The portion of the bowel shut off became gangrenous and then a fatal peritonitis developed.

THE RELATION BETWEEN THE PREOPERATIVE CONDITION OF THE PATIENT AND OPERATIVE MORTALITY IN EXOPHTHALMIC GOITER

WILLARD O. THOMPSON, M. D.; SAMUEL G. TAYLOR III, M.D., and KARL A. MEYER, M.D.

The Department of Medicine, Rush Medical College, and The Cook County and Presbyterian Hospitals, Chicago

CHICAGO

It is generally agreed that, in most instances, the best treatment for exophthalmic goiter is the removal of most of the goiter under suitable

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conditions. It, therefore, becomes of great importance to devise ways and means of keeping the mortality from operation at the lowest possible rate. In order to accomplish this end, two factors are paramount: 1. the skill of the surgeon, and 2. the condition of the patient at the time of operation. It is difficult to prove which of these factors is the more important. It is only necessary to compare the postoperative reactions of patients operated on by poor surgeons with those of patients operated on by skillful surgeons to be convinced of the importance of surgical skill. Before the days of iodine, the best surgeons had a mortality of from 1 to 4 per cent., while the mortality as a whole varied from about 10 to 15 per cent. At present the best surgeons have a mortality of from about 0.25 to 1 per cent., while the mortality throughout the country is much greater. This difference is partly a matter of skill developed through experience in performing a large number of operations, because the mortality record of every thyroid surgeon has shown a well marked reduction with increasing experience. However, the differences in the mortality rates of the best surgeons and surgeons of average ability are not to be attributed only to differences in surgical skill but also to differences in surgical judgment. The best surgeons learned when to operate and when not to operate, as well as the extent of the surgical procedures their patients would tolerate.

Important as surgical skill may be, this paper is concerned chiefly with the importance of the preoperative condition of the patient in determining operative mortality, a factor which we believe ought to be stressed as much as skill in performing a thyroidectomy. Through the co-operation of Dr. Tice and other members of the staff, we have had an unusual opportunity during the past two years to study the problem at the Cook County Hospital. By paying great attention to the preoperative condition of the patient it has been possible to reduce the mortality from about 13 per cent. to about 4 per cent. Before our study was undertaken, the mortality from toxic adenoma was 9 per cent., from non-toxic adenoma 4.1 per cent., and from simple goiter 2.7 per cent. Our series of other types of goiter are too small to draw conclusions from, there having been 12 cases of toxic adenoma with no deaths and 14 cases of non-toxic adenoma with no deaths. It may be noted that the mortality among the patients with exophthalmic goiter that we followed is the same as that in the group of patients with non-toxic goiter followed by other observers. The significance of this reduction lies in the fact that it has been accomplished without any change in surgical personnel and without any significant change in surgical technique. For the proper evaluation of these figures, it is necessary to state that some of the reduction must be attributed to changes in treatment during the immediate postoperative period, notably, to the elimination of severe reactions from the administration of poor glucose both subcutaneously and intravenously. While the mortality of 13 per cent. may seem enormous, it should be borne in mind that the mortality in all large municipal hospitals is very high. The rate of 4 per cent. is still too high and we have hopes of reducing it further. However, the mortality in large municipal hospitals, where all general surgeons of varying skill do goiter surgery, may never be reduced to the level reported from highly specialized private clinics, where only two or three men of unusual skill do all the thyroid surgery. We consider that the single most important factor in the reduction in mortality has been the preoperative condition of the patient. In order to get the patients into the best possible condition for operation, it has been necessary to pay great attention not only to the administration of iodine but also to emotional instability, muscle weakness, rest, diet and infection.

Iodine. Although we do not minimize the great value of iodine, too much reliance has been placed on it in the past. There has been a tendency to feel that as long as iodine was being given, little else mattered. It was claimed that it abolished crises and the need for multiple-stage operations. With increasing experience, however, it was gradually learned that patients died from postoperative crises in spite of the administration of large doses of iodine and that it was still necessary to perform the operation in at least two stages in all patients in whom there was any doubt about the ability to withstand surgery. Iodine has, therefore, come to be regarded as an invaluable aid, but one that must be used not alone, but in conjunction with every other worthwhile therapeutic measure.

It used to be taught that a thyroidectomy should be performed as soon as the metabolism shows a maximum reduction during the administration of iodine, namely in from 7 to 14 days. However, rigid adherence to this principle has resulted unnecessarily in death in some patients, for the reason that maximum clinical improvement rarely occurs as soon as the metabolism has shown its maximum reduction, but only some time later when the patients have had an opportunity to derive the benefits of the lowered rate of metabolism. It was thought that if operation were delayed, there was great danger of a relapse occurring in spite of the administration of iodine. The danger of such a relapse is not great if operation is delayed from 1 to 3 weeks beyond the time of maximum reduction in metabolism. In some patients we have delayed operation as long as 3 months with no untoward results. When the metabolism does rise after an initial reduction, we are faced with the problem of the development of refractoriness to iodine and its management. If the rise in metabolism occurs very gradually over a period of many weeks, it is probably not a contraindication to operation if other things are satisfactory. If the metabolism is rising rapidly, however, it is unwise to attempt any surgical procedures, although the most desirable method of treatment under such circumstances is still to be worked out. It is not yet clearly established whether the development of this refractoriness is caused by the iodine itself or by the natural course of the disease. In some patients we have omitted iodine for from 1 to 2 months under these circumstances and then performed a thyroidectomy after a second remission during the administration of iodine. In these instances, the effect of iodine has been just as great after a period of omission as it was initially.[1]

We have had a patient under observation recently in whom we thought it wise to modify this plan of procedure. The patient was an Italian girl of 23, whose metabolism, during the administration of iodine, rose unusually soon after the initial fall. After several weeks her appetite became poor, she vomited a few times and her weight dropped markedly. Not all patients who show a rise in metabolism during the administration of iodine become completely refractory to it.[1] If iodine had been omitted and the metabolism had continued to rise, the intensity of the disease might have become still greater and the patient might have died. We therefore decided to continue iodine and give x-ray treatment in an effort to tide her over the period of refractoriness. After each x-ray treatment there was a rise in basal metabolism for several days and an increase in the vomiting, to be followed by some improvement after about one week. Because of the temporary increase in the severity of the disease which follows x-ray treatment, this form of therapy should not be employed in patients who are desperately ill in spite of the administration of iodine. Moreover, the treatments should not be given at intervals of less than one week, because two reactions coming close together may jeopardize the life of the patient. In x-ray therapy for toxic goiter, the motto should be to make haste slowly. The treatment should be started while the patient is still in good enough condition to stand it and with the expectation that, in most instances, the beneficial effects do not become definite for several weeks. After the first two treatments the patient's loss of weight ceased and she began to gain. At present she has gained 17 pounds and is in excellent condition, although her metabolism is still plus 50 per cent. Indeed, she is now in much better condition to withstand operative procedures than she was two weeks after starting iodine, although her metabolism is plus 50 per cent. now as compared with plus 34 per cent. then. Numerous other observations have impressed upon us the fact that the clinical condition of the patient is usually of more value in gauging the risk of operation than the height of the basal metabolism, regardless of whether iodine is being administered or not. It is the experience of every worker in the field to see patients with rates of plus 60 per cent. before operation have comparatively mild postoperative reactions and patients with rates of plus 20 per cent. die of a thyroid crisis after operation. This principle is of value in the treatment of patients who show no response to iodine initially. Provided the patient is in good condition, operation can usually be proceeded with, even if the metabolism shows no reduction during the administration of iodine.

We have pointed out elsewhere that the dose of iodine does not matter within very wide limits

and the form in which iodine is administered seems to be of little consequence.[2,3]

Emotional Instability. It has been our impression that the single most important factor in gauging the ability of patients to withstand operative procedures is the degree of emotional instability, regardless of what happens to the basal metabolism. A postoperative thyroid crisis in a patient who has shown a well marked reduction in metabolism before operation is usually associated with the presence of marked emotional instability in the preoperative period. The intensity of the reaction following thyroidectomy is, in general, directly related to the intensity of emotional instability before operation, a fact which Plummer would explain by saying that the degree of emotional instability and hence the severity of the postoperative reaction, depends upon the rate at which the "abnormal product" is formed.

A thyroidectomy for exophthalmic goiter is never to be regarded as an emergency operation and when it is done as such the outcome is usually not favorable. Whenever emotional instability is marked, the operation should be postponed until it decreases in intensity. Usually this occurs with rest, which has been clearly demonstrated to exercise a beneficial influence on the disease. For this reason we have always made it a point to prepare patients for operation in the hospital. While we do not keep them completely confined to bed except in the presence of cardiac decompensation, the freedom from the daily routine of home is essential for maximum improvement.

Muscle Weakness. Marked muscle weakness, as gauged by inability to climb up on a chair without assistance, is an unfavorable sign and is often present in patients who also show marked emotional instability. When the two are pronounced in the same patient, operation should never be proceeded with. Like emotional instability, its intensity diminishes with rest and the administration of a diet sufficiently high in calories to make the patient gain weight.

Diet. Marked loss of body weight has come to be regarded as an unfavorable sign in exophthalmic goiter. This loss occurs for only one reason, namely, an inadequate caloric intake. Provided patients will eat enough, they can always be made to gain weight. One point that is not always appreciated is that, in order to accomplish this end, it is necessary that the caloric intake exceed the basal by about 100 per cent. This means that most patients must receive from 4,000 to 5,000 calories daily. Such a diet will inevitably contain sufficient protein to replace what has been lost from the body storehouses.

A well marked gain in weight is a favorable sign, even if the basal metabolism shows no reduction and, when combined with a marked reduction in metabolism, points to a favorable outcome from the operation.

Infection. One problem that we have had to contend with has been infection. It is very common for our patients with exophthalmic goiter to develop severe upper respiratory infections, notably acute follicular tonsillitis. The recovery from these is often slow and there is often a tendency to operate on patients while they are still running low-grade fevers. The danger of the infection spreading to the lung during operation cannot be stressed too strongly, and no surgical procedures should be undertaken until the temperature has been normal for at least two weeks following the milder infections and for four weeks following the more severe infections. We have recently had one such patient who developed a complete heart block three weeks after her infection had subsided. Two such patients died before any surgical procedures were carried out. Of the two deaths among patients that one of us (W. O. T.) followed in Boston, one occurred in a patient who had a very severe case of acute rheumatic fever three weeks before operation and the other in a man who had a sore throat and was still running a low-grade fever shortly before he was operated upon. Of the six patients who died following operation in the Presbyterian and Cook County hospitals in Chicago, while wholly or partly under our care, in three there was an upper respiratory infection shortly preceding operation. Two of these patients died of pneumonia on the fourth and fifth postoperative days, respectively, and one from pressure on the trachea by a hemorrhage. One of the patients who died from pneumonia also had diabetes. The other three patients died of typical postoperative crises. In these three, emotional instability was marked before operation and in all three, but particularly in two of them, muscle weakness was also present in marked

form. In one of these patients the basal metabolism had dropped from plus 100 per cent. to plus 30 per cent. with rest and iodine; in one, although the metabolism had shown no reduction during the administration of iodine, it was only plus 30 per cent. and he had gained some weight at the time of operation; while in the third, the response to iodine was slight, the basal metabolism being plus 55 per cent. at the time of operation, although he had gained fifteen pounds in weight. The operation on the third patient had been rendered technically difficult, and hence unduly long, by scar tissue following previous ligations of the superior and inferior thyroid arteries.

It is still necessary to stress the fact that cardiac irregularities, in particular auricular fibrillation, are regarded too seriously. Transient attacks of paroxysmal tachycardia appear to be more serious than those of auricular fibrillation. On the whole, however, the indications for thyroidectomy are virtually the same whether cardiac irregularities are present or not. We have sometimes asked surgeons in vain to perform a thyroidectomy in patients with auricular fibrillation, only to have the cardiac damage increase because of the delay. About the only common cardiac abnormality that need cause alarm is decompensation which does not clear up with rest. Under these circumstances a thyroidectomy should not be performed until it becomes evident that operation is a last resort. A much higher mortality rate than in patients with normal hearts may then be anticipated. It is debatable whether digitalis and quinidine are of any value. We do not use either drug. In particular, it has been our experience that digitalis has seemed to do no good and in some instances to do harm.

SUMMARY

Apart from surgical skill, the most important factor in determining the risk of thyroidectomy for exophthalmic goiter is the preoperative condition of the patient. Great attention should be paid not only to the administration of iodine, but also to emotional instability, muscle weakness, rest, body weight and infection.

The two most important factors in gauging the risk of operation, regardless of the height of the basal metabolism, would appear to be emotional instability and muscle weakness. When both are marked in the same patient, an unfavorable outcome of the operation is common.

Because of the beneficial effect which rest exercises on the course of the disease, patients should be prepared for operation in the hospital, although they should usually be allowed ambulatory privileges.

In a few selected patients in whom the disease is refractory to iodine, x-ray treatment may be used to prepare the patient for operation, but this form of therapy should never be used in desperately ill patients because it produces a temporary increase in the severity of the disease. The treatments should not be given at intervals of less than one week, and no improvement should be expected in most cases for a period of several weeks.

A gain in body weight is a favorable sign, but in order to produce a gain, the caloric intake in most cases must exceed the basal by at least 100 per cent.

Following mild upper respiratory infections, no operative procedures should be carried out for at least two weeks after the temperature is normal, and following severe upper respiratory infections, for at least four weeks after it is normal.

The criteria for gauging the risk of operation are the same in patients who present cardiac irregularities as in those who do not.

The time to prevent postoperative crises is in the preoperative period. By applying this principle to the treatment of exophthalmic goiter in the Cook County Hospital in Chicago, it has been possible to reduce the operative mortality from about 13 per cent. to about 4 per cent. without any change in surgical personnel or significant change in surgical technique.

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3. Thompson, W. O.: Factors of Importance in the Treatment of Exophthalmic Goiter. Illinois Med. J. **62**: 520,1932.

DISCUSSION

Dr. George Parker, Peoria: It is certainly very gratifying to learn of the reduction of mortality in exophthalmic goiter that Dr. Thompson and his colleagues have brought about.

The points mentioned in this paper are undoubtedly of the greatest importance. Formerly, before we began

to study the use of iodine and the other factors mentioned by the essayist, we paid considerable attention to the heart.

Now the condition of the heart has more or less faded out of the picture. You do not hear so much discussion about heart conditions in hyperthyroidism. In fact, we know now that there are no distinctive histopathological changes in the hearts of patients dying of acute hyperthyroidism.

There are, however, some heart conditions which probably influence mortality. Auricular fibrillation is very common, and is not a contraindication to operation. Auricular flutter, however, is a bit more serious, and should receive attention. Hypertensive heart disease and angina pectoris also are no especial contraindication to operation.

Congestive heart failure is more serious, and in advanced cases of this disorder with acute hyperthyroidism, the mortality will be lowered by giving in advance salyrgan and large doses of ammonium nitrate. It has been our experience that digitalis and quinidine do not alleviate the irregularities of the heart in hyperthyroidism, but possibly are helpful in some cases of flutter. Such cases are best treated with digitalis and quinidine after the thyroid is removed. It is here that you obtain the best results.

The points mentioned in Dr. Thompson's paper are more accurate indications of operability than the severity of cardiac lesions. I do not believe that surgeons hesitate to operate on hyperthyroid cases whose hearts are rather seriously damaged.

It is rather hard to evaluate heart cases at times, but I do know this much about them: As long as a hyperthyroid condition exists the heart is not very apt to improve; and although it does raise the mortality by taking on some of these seriously damaged hearts, the patient certainly should have the opportunity of surgery and I believe the prognosis is better if he is operated on. The recent work of Dr. Blumgart with which many of you are familiar demonstrates that total thyroidectomy can be done with good effect in the presence of serious heart lesions.

Dr. Lindon Seed, Chicago: Dr. Thompson's paper deserves more commendation than usual. Every physician dealing with goiters ultimately arrives at about the same criteria to determine operability in exophthalmic goiter. My own criteria are largely three in number:

1. The patient must be adequately iodinized.
2. The weight curve must be favorable.
3. The loss of strength not too great.

You will note I do not include emotional instability. Yet in retrospect that is wrong. Before deciding on an operation, I always have the patient get out of bed and walk down the hall and step up on a chair. Then I take a look. If she is very restless, if there is a marked tremor, and the pulse rate has risen to 150 or 160, I postpone the operation. I have always considered this a test of the reaction to stress and strain, but it is at the same time a test of emotional instability.

I would like to subscribe to two points that Dr. Thompson has brought out with which all do not agree. First, ligation of the superior thyroid vessels is a useless operation; second, that iodine can be given in exophthalmic goiter just as long as one feels like giving it. I have been impressed in two respects with Dr. Thompson's paper. First, is the thoroughness and carefulness of his case records. When I look at his records I feel a little ashamed of my own. The second point is also a little disconcerting. A group of surgeons are removing goiters with a certain mortality. An internist prepares the patient and cuts the mortality rate to one-third. A surgeon likes to delude himself into believing that a clever operation is quite an accomplishment. It would appear as though there were a little doubt upon that point. It has been said that there is no one more dangerous than a clever surgeon, and there is a certain amount of truth in that more or less facetious remark.

Dr. Hugo R. Rony, Chicago: I would like to ask Dr. Thompson if he has had any experience with irradiation of the hypophysis in the treatment of exophthalmic goiter.

European authors reported recently remarkable results with x-ray treatment of the sellar region in seemingly intractable cases of toxic goiter.

Dr. Thompson (closing): I am very glad to hear that Dr. Parker feels the same way about digitalis and quinidine as we do.

Henry Plummer pointed out years ago that he thought digitalis was harmful. His reason for this was that the mortality from toxic adenoma remained at 3.5 per cent. long after the introduction of iodine until the administration of digitalis in such cases was stopped, whereupon it dropped to one per cent. We never use digitalis in preparing patients for operation, regardless of whether the heart is fibrillating or not.

I am very glad to hear that Dr. Seed agrees with us on the indications for operation. Once again we shall have to draw on Plummer, as Dr. Seed has done. Dr. Plummer has told me on more than one occasion that the thing that largely determines whether a patient will die or not following a thyroidectomy is the intensity of emotional instability which he in turn considers to depend upon the rate of production of "abnormal product."

There is no doubt, of course, that success in the management of this disease depends upon intelligent cooperation between physician and surgeon. I do not mean to minimize the importance of surgical skill which is of the greatest importance, a fact which Dr. Seed himself has demonstrated.

With regard to Dr. Rony's question, we ourselves have not given x-ray therapy over the hypophysis in any case of exophthalmic goiter.

Did I understand you to say these were your results? (No, not mine, just reports.—Dr. Rony.)

Of course much work has been done on hyperplasia of the thyroid following administration of extracts of the anterior lobe of the pituitary. However, I should like to point out that the clinical picture of acromegaly is different from that of exophthalmic goiter, and I doubt very much whether treatment of the hypophysis will cure exophthalmic goiter, although the report is certainly a very interesting one.

AGRANULOCYTOSIS

FREDERIC W. BURCKY, M. D.
EVANSTON, ILLINOIS

History. As O. H. Perry Pepper[1] has indicated, it was the work of Werner Schultz,[2] reported in November, 1922, that correlated certain ulcerative sore throats with characteristic blood changes. This syndrome was later named agranulocytic angina by Friedemann.[3]

As early as 1857, Gubler[4] described a gangrenous angina which he differentiated from diphtheria, and in 1865 Trousseau[5] published a similar description.

Peter,[6] in 1870, gave an accurate account of the gross appearance of the blood in gangrenous sore throat.

Morrell Mackenzie,[7] in 1880, in his "Manual of Diseases of the Throat and Nose," described a gangrene of the pharynx, distinguished it from diphtheria and scarlet fever, and called it "putrid sore throat." This term was used commonly for about twenty years.

Pepper states, "It is further interesting to note than by the beginning of the new century the text-books of nose and throat diseases had begun to omit the heading 'Putrid Sore Throat,' until by the time Schultz described the syndrome there was no description in the text-books which corresponded at all to the picture of agranulocytic angina. In the recent books, of course, this omission has been rectified by the description of the syndrome under its present name."

Since 1922 there has been a constant and increasing study of this disease.

Etiology. The etiology of agranulocytosis has not as yet been definitely proved. A great many investigators have attempted, by various types of inoculation in animals, to produce the analogue of clinical agranulocytosis. Until quite recently these have been unsuccessful.

Emery W. Dennis,[8] in June, 1933, reported a series of experiments in rabbits which show great promise. He was impressed by the capability of certain pyogenic bacteria (streptococci, staphylococci, and pseudomonas aeruginosa) to produce in culture media a toxin, leucocidin, which destroyed white blood cells, especially granulocytes. This information was derived largely from the work of Nakayama,[9], Gay and Oram,[10] Van de Velde,[11], Reudiger,[12] and Gheorghiewsky.[13]

The bacteria most frequently found in the cases of clinical agranulocytosis reported by other workers, which he reviewed, were streptococci and staphylococci. Dennis felt that if viable cultures of such organisms could be enclosed in a membrane which would permit egress of only the soluble products of bacterial metabolism, leucocidins, an experimental agranulocytosis could be induced in animals.

He brought about this condition by injecting a living eighteen-hour culture of organisms into parchment capsules and sealing the punctures with celloidin. After a thorough soaking in 70 per cent alcohol, these capsules were introduced into the abdominal cavities of twenty rabbits, through small incisions made under aspetic conditions. Two rabbits received capsules of sterile broth as controls and were entirely negative. Staphylococcus aureus, streptococcus hemolyticus, streptococcus viridans, and bacillus proteus Asiaticus were separately used, all producing granulopenias. Streptococcus viridans produced, in two animals, a syndrome practically identical with acute clinical agranulocytosis, terminating fatally.

Dennis suggests "that agranulocytosis in man is due to the action of leucocidin rather than a specific microorganism." His work, if corroborated, will be exceedingly important.

Non-infectious toxic agents have frequently been suspected of producing agranulocytosis. Many cases have been reported following the use of arsphenamine.[14,15,16,17,18] It is therefore important that all cases of infection which are being treated with arsenic have frequent white and differential blood counts.

Roy Kracke[19] has suggested that the vast increase in the use of coal tar benzol derivatives as therapeutic agents, in the past few years, may be responsible for the recent increase in the number of cases of agranulocytosis reported. Watkins and Giffin,[30] and Madison and Squier,[31] have indicated amidopyron and barbiturates as specific members of this group.

Fitz-Hugh and Comroe[20] reported two patients who had taken quinine for "supposed malaria" at various times during their lives, and mention it as a possible etiological factor.

Doan[21,22,23,24] and others believe that a defi-

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ciency of purine and nucleotide production in the body permits, in part at least, the destruction of the granulopoietic tissues.

A slightly larger number of the reported cases of agranulocytosis have occurred in women, although in Fitz-Hugh's series of 18 cases only seven were females. His youngest patient was 19, the oldest was 78, and the average age was 48.1 years.

Heredity is supposed to have no influence as an etiological factor. In my own practice I have seen one instance in which a daughter developed a granulopenia (3,800 leucocytes with 12 per cent. granulocytes) following a sore throat from which she recovered. This occurred ten months after the onset of a fatal agranulocytosis in her mother which also began with a sore throat.

Allergy has been considered as a causative factor for this disease.

Agranulocytosis is not thought to be contagious in the same sense as measles or smallpox.

In the chronic type there is frequently a tendency to the lowering of the white count and granulocyte percentage during menstruation.[18]

Pathology. The pathological manifestations of agranulocytosis are characterized by destruction of the granulopoietic tissues, especially the bone marrow; marked lowering of the leucocyte content of the blood, especially the granulocytes, sometimes to the point of their complete disappearence; ulcerative lesions of the mucous membranes; petechial hemorrhages, and in the more chronic forms anemia of a secondary type.

Destruction of the granulopoietic tissues begins early in the disease, is especially marked in the bone marrow, and has been demonstrated in practically every patient who has been examined post mortem. If clinical improvement occurs, the bone marrow shows areas of hyperplasia. The leutocytes in the blood are markedly diminished in numbers, Fitz-Hugh reporting a total white count of 50 cells. With these very low counts there is usually a complete absence of all granulocytes, basophilic and eosinophilic as well as neutrophilic. Therefore, the name "malignant neutropenia" is not correct and should be abandoned. If any improvement in the patient's condition occurs, various immature forms of granulocytes gradually appear in the circulating blood (myeloblasts, normoblasts, myelocytes, and megakaryocytes).

Gangrenous, ulcerative mucous membrane lesions are frequently seen. These occur most often in the mouth and throat, but also are found in the colon and rectum, the vagina, the urinary bladder, and in the trachea and bronchi. These are necrotic in appearance, have very little underlying and surrounding inflammatory reaction, are covered with a dirty, gray membrane, and are frequently foul smelling.

Bleeding occurs often, both as petechial hemorrhages and from the ulcerative lesions.

Symptoms. Marked prostration is the most common symptom manifested in agranulocytosis. It comes on as early as twenty-four to forty-eight hours after the onset in acute cases, is usually pronounced during the entire course of the disease, and varies in direct proportion to the granulocyte content of the blood.

Fever is nearly always present and usually quite high. Fitz-Hugh reports a maximum oral temperature of 105.5 degrees and Rosenthal[25] 107.0 degrees in one patient.

Pain in the areas involved by the ulcerative lesions is a frequent complaint.

A rapid and sometimes thready pulse is often noted.

Evidences of late secondary infections, such as bronchopneumonia and general sepsis, when they occur, present themselves in the characteristic manner.

Diagnosis. The diagnosis of agranulocytosis can be definitely made only when the white blood count is greatly reduced, usually below 1,000 cells per cubic millimeter, and when the granulocytes are either completely absent or found in very small numbers, and usually abnormal in character. The presence of such symptoms as great prostration, necrotic mucous membrane ulcerations, and high fever are important corroboratory findings.

Treatment. The therapy of agranulocytosis is at present multifarious, largely empirical, and probably includes procedures and agents which are not only of doubtful curative value but actually detrimental. Because of the indictment of benzol derivatives as toxins, their use should be avoided in all patients manifesting leucopenia. Mixtures of amidopyrin and barbiturates such as allonal seem especially to be contra-indicated. One of the opium derivatives should be employed to allay pain and restlessness.

Among the most promising methods of treatment is the administration of salts of purine bases, such as adenine* and guanine. Paul Retznikoff,[26] in 1930, published an account of the intravenous use of adenine sulphate with favorable results, and in 1933[27] he employed it in a series of 15 cases with 11 recoveries.

One gram of adenine sulphate is dissolved by boiling for two or three minutes in 30 to 40 c.c. of normal saline solution, allowed to cool slightly, filtered into a syringe through a small adapter containing cotton, to keep out all undissolved crystals, and injected intravenously while still warm (about 105 to 110 degrees F.). This dose is to be used three times a day for at least three days. It is non-toxic, gives no disagreeable reactions, and may be used in the presence of myocardial disease. Complete solution of the drug may be accomplished, when difficult, by adding a drop or two of dilute hydrochloric acid or increasing the amount of normal saline to 50 c.c.

Jackson and his co-workers[28,29] used pentose nucleotide† with considerable success in a series of 69 cases of "malignant neutropenia." Pentose nucleotide was introduced as "Nucleotide K96," and is now marketed under the trade name of "Pentnucletotide." It is obtainable in 10 c.c. rubber-stoppered vials, each containing the equivalent of 0.70 grams of the solid material. The dose recommended is one ampoule intramuscularly twice a day until the leucocyte count and granulocyte percentage have risen considerably. This rise usually begins in four or five days, and at the end of about a week one ampoule may be given every twenty-four hours. It is suggested that this regime be continued until the blood count has been approximately normal for at least three consecutive days. Thereafter the frequency of the injections will be determined by what occurs to the blood picture. In certain resistant cases larger amounts of pentose nucleotide have been used. When the need is urgent, 10 c.c. of pentose nucleotide solution may be diluted with 100 c.c. of warm normal saline solution and injected slowly intravenously every morning for four or five days, followed each evening by 10 c.c. of the undiluted solution intramuscularly. The latter method is then to be continued as long as indicated.

Jackson called attention to the reactions, such as dyspnea and palpitation, which usually follow immediately after intravenous injections, and the occurrence of chills with fever some hours later. He warned against the use of pentose nucleotide in patients with myocardial damage.

Fitz-Hugh and Comroe[20] report a reaction of "alarming character" following an injection of pentose nucleotide in one patient, but do not state whether this was given intravenously or intramuscularly. They further state that another patient "reacted violently with fever up to 104.0 degrees with each intramuscular injection, but tolerated the same dose intravenously without reaction." They treated five patients with this drug, all of whom died.

Watkins and Giffin[30] used desiccated yellow bone marrow‡ orally with favorable results. The dose recommended by them is from 300 to 500 grains per day, continued until the blood count is approximately normal. After this it is gradually reduced to a maintenance dose of 50 to 75 grains per day, which is continued for one month or longer. Beef yellow bone marrow may be obtained fresh from the Stock Yards and used in doses of approximately one ounce two to four times daily.

Sodium nucleinate has been given orally with benefit. The dose is from one to four drams given one to three times a day. When this is continued over a considerable period of time, symptoms similar to gout have been observed.[32]

Transfusions of 500 c.c. of whole blood have been frequently used in the treatment of agranulocytosis with varying success. Fitz-Hugh[20] and Taussig[33] are among those who think it of some value, whereas Harkins[18] regards it as useless, and I regard it of very little value therapeutically.

Leucocyte extract given intramuscularly in 10 to 20 c.c. doses, one to three times a day, is thought by some to have a favorable effect.

Foran, Sheaff and Trimmer[34] reported remissions in five patients who received liver extract

*Adenine sulphate is obtainable, as a white crystalline powder, put up in glass stoppered bottles of five grams or larger, from The Eastman Kodak Company, Rochester, New York.

†Pentose nucleotide is obtainable from Smith, Kline and French Laboratories of Philadelphia, Pa.

‡Dessicated yellow bone marrow is put up in 3½ grain capsules by Frederick Stearns and Company, Detroit, Mich.

parenterally.§ The commercial preparation of the fraction "G" of Cohn was used in doses equivalent to 100 grammes of fresh liver. This was injected intramuscularly, or diluted with 20 c.c. of distilled water and injected intravenously every eight to twelve hours until improvement occurred. After that the same dose and frequency were continued by the oral route.

Exposure of the body to x-ray has been thought by many to be of benefit.[18,33,35,36] Its use is not without danger, for it may destroy the myelogenetic function of the tissues which it is employed to stimulate. Doan[24] especially sounds a note of warning in this respect. X-ray is usually given in one-twentieth erythema doses every other day for three treatments.

Arsenical preparations are rather frequently used because of the common occurrence of Vincent's organisms in the necrotic mucous membrane lesions. Sodium cacodylate in daily doses of from two to ten grains is injected hypodermically, or from 0.45 gm. to 0.60 gm. of neosalvarsan are given intravenously every three days. In the light of our present information it would seem that arsenic should not be employed as a therapeutic agent in agranulocytosis.[14,15,16,17,18]

Hare and Childrey[37] report temporary improvement of an agranulocytic angina occurring in an allergic individual,following daily intravenous injections of one gram of calcium gluconate in 10 c.c. of "solution," presumably water, for four consecutive days.

Yeast has been tried in doses of one to two cakes, one to four times daily.

The production of sterile abscesses in the thigh muscles by the injection of 10 c.c. of turpentine is another method of attempting to stimulate granulopoiesis.

Daily intramuscular injections of from 20 to 50 c.c. of whole blood obtained from patients who have recently recovered from Vincent's infections have been used.

Among the other measures, to be noted merely for completeness, are injections of nuclein solution, reticulin, metaphen, and formic acid.

In addition to the aforementioned specific methods and agents, such general measures as ample fluids, highly nutritious foods which contain a generous proportion of protein, necessary local treatment of the lesions, nasal feeding for dysphagia, and tracheotomy for respiratory obstruction, are, of course, to be employed.

At present the most successful treatment of agranulocytosis accomplishes a replenishment of the materials necessary to the manufacture of granulocytes in the body. The agents most suitable for this purpose are salts of purine bases, such as adenine and guanine, nucleotide compounds, such as pentose nucleotide, sodium nucleinate, and yellow bone marrow.

In my opinion these substances also act as buffering or toxin-absorbing materials, by interposing themselves in solution between the causative agent of agranulocytosis, which very probably is also in solution, and the granulocytes, thereby deactivating or neutralizing the toxic agent and rendering it harmless to intact living white cells.

Prognosis. The prognosis of agranulocytosis is extremely grave. Before the use of the present therapy the mortality rate was between 80 and 90 per cent. for the first attack. The condition frequently recurred after an interval of weeks or months, nearly always terminating fatally. Various workers show lower death rates with the several therapeutic measures employed. Retznikoff[27] in a series of 15 cases and Jackson[29] in 69 cases both report a mortality of 26+ per cent.

CONCLUSIONS

1. The cause of agranulocytosis is not known. As a result of the action of the products of infection, leucocoidins, a marked disturbance of granulopoiesis and purine metabolism may occur.

2. Agranulocytosis is recognized with certainty by a low white cell count and the absence of granulocytes in the blood.

3. Effective treatment is, as yet, largely limited to the administration of purines and allied substances

4. Amidopyrin and barbiturates should be avoided in all cases of leucopenia.

5. In the past agranulocytosis has been regarded as an almost inevitably fatal disease, but recent reports give a somewhat more favorable outlook.

636 Church Street.

§Parenteral liver extract is obtainable from The Lederle Laboratories of New York, N. Y., as "Solution of Liver Extract. Parenteral," and is put up in sterile 3 c.c. vials, each containing the equivalent of 100 grams of fresh liver.

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DISCUSSION

Dr. T. C. Galloway, Evanston: Dr. Burcky deserves great credit for his work on agranulocytosis, because he demonstrated the curability of this condition, while most of us were meeting our first cases with a feeling of helpless apprehension.

At that time most treatment seemed ineffectual, but four out of six cases seen in the last two years have recovered under such treatment as Dr. Burcky has outlined. Though laryngologists often see these cases first they are purely medical and so far as I have been able to see local treatment has had no notable value except where special intervention like tracheotomy was necessary.

The lesions have progressed until granulocytes reappeared and necrotic areas quickly separated with relatively rapid healing.

Prostration should be emphasized as an early important symptom, and it has been seen in three of my cases before the local lesion was characteristic,—prostration out of proportion to any appearance in the throat. If we do not make routine blood examinations in anginas at least we must do them when this characteristic great prostration is present.

Diagnosis of agranulocytic angina must not be made too quickly, or too easily, because, as Dr. Jaffe has shown at the County Hospital, this whole group may be hard to classify. It may not be a pure type, and it may be hard to differentiate from other conditions, especially from a leukemia, either by local conditions or by the blood picture.

Dr. H. L. Ford, Champaign: I was especially interested in this presentation in view of the fact that I recently called Dr. Burcky in consultation to see a case of agranulocytic angina, which terminated favorably.

The woman at the time I saw her had a severe adenitis and a provisional diagnosis of peritonsillar abscess had been made. Her blood count was 600 white cells with absolutely no polymorphonuclear cells in the differential. She was removed at once to the hospital, because the condition looked like leukemia.

The diagnosis of agranulocytic angina was made with the differential blood smear. Adenine sulphate and pentnucleotide were ordered. She was given one in-

jection of the latter. And as the adenine sulphate came from the Eastman Kodak Company in a small bottle without instructions from the drugstore, it was left for me to decide how this should be given.

I called Dr. Tom Galloway, (who just finished discussion of the paper) and asked him how this should be administered. Dr. Galloway said, "I am not familiar with the method, but I will put you in touch with a man who can tell you." At that time he was in attendance at a medical meeting, and called Dr. Burcky to the telephone.

Subsequently Dr. Burcky came down in consultation on the case as the question had arisen as to whether blood transfusions should be continued. She had had one the first evening after admission. The next day her blood count as I recall, was about 800 white cells. After going over the literature, I felt no further blood transfusions should be given, but rather that we should reply on the pentnucleotide, and the adenine sulphate.

Long distance telephone calls were put through to two men who were associated with large medical institutions in Chicago. Both men insisted upon blood transfusions as being probably the most important factor.

I should like to add here that to my mind, though men are authorities along certain lines and their word carries a lot of weight, if they do not happen to be up on a particular subject, such as agranulocytic angina, the diagnosis and decision on a thing of this kind should be left to some one who is. Because I think we will all grant there are certain men who are doing research work along special lines, and I think it behooves us in cases of this kind, where the matter is rather urgent to be familiar with those who are in touch with these special lines of recent research.

That is the way it rested in this case, because on study of the literature, blood transfusions and x-ray of the long bones according to many authorities are contraindicated, because one may get a further leukopenia, with the blood transfusion.

Some authorities refer to this as a pernicious leukopenia because of some similarity to pernicious anemia. Another point; in 1891, it was proven that adenine and guanine had the ability to produce a leukocytosis. It was not until 1930 that this application was made in the treatment of agranulocytosis.

As to the reactions from pentnucleotide, this lady had many. After about the fifth or sixth dose she began to develop marked systemic reaction, dyspnea, shortness of breath, rapid, thready pulse. And we had to reply almost entirely on adenine sulphate intravenously.

There is a question as to whether the beneficial pentnucleotide response may not be entirely a response to the adenine sulphate contained in the pentnucleotide.

Dr. Burcky: One must be careful about having any arbitrary ideas concerning the cause of agranulocytosis, because we do not know. Emphasis at the present time is being placed on both amidopyrine and barbiturates, which probably are responsible for some of the cases.

I am sure myself that infection and probably leucocidin are very important as causative factors.

I spent relatively little time on the etiology because I wanted to give you the treatment in considerable detail so that you might know just what to do for this condition.

I have never seen a reaction to adenine sulphate. The nearest approach was an hypernea which occurred about twenty minutes after one injection.

Anemias which are found in this disease are usually secondary. In classification of agranulocytosis I applied the term very loosely to include that large group of cases which we know very little about.

RETINITIS PIGMENTOSA

RICHARD A. PERRITT, M. D.
Junior Staff, Illinois Eye and Ear Infirmary
Dr. T. D. Allen's Service
CHICAGO

Historical: The occurrence of permanent night blindness and the liability to run in families has been known for many years. Overgun[1] in 1744, Samuel Pye[2] in 1828, Stievenait[3] in 1847. Soon after the introduction of the ophthalmoscope in 1851, the cases were separated into those in which retinal changes could be seen and others (a minority) in which the appearance was normal and remained so. The cases in the former class were named retinitis pigmentosa by Donders[4] in 1857, a misleading term because it suggests that the disease is of inflammatory origin. Leber[5] in 1871 first described a case of retinitis pigmentosa sine pigmento; Mauthner[6] in 1872 described a case of choroideremia. Mooren[7] in 1882 described and named retinitis punctata albescens while Fuchs[8] in 1896 described and named atrophia gyrata choroidea et retinae. In night blindness without visible changes we find two very different groups; in one the night blindness is present from birth, is permanent, does not progress and is hereditary—congenital stationary night blindness described by Leber in 1877; while the other may set in at any time of life, is temporary, curable and depends upon the exhaustion of a poorly nourished retina by excessive exposure to sunlight, the so-called functional, essential, idiopathic or acute night blindness.

Liebreich,[9] seeking an explanation of the prevalence of retinitis pigmentosa in certain families, discovered that subjects of the disease were often the children of cousins or blood re-

Read before Section on Eye, Ear, Nose and Throat, at Springfield, May 16, 1934.

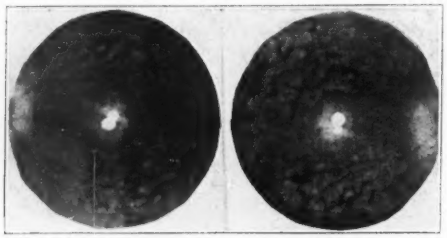
lations and his classical paper published in 1861 and illustrated by his Atlas in 1863 did much to stimulate inquiry as to the influence both of consanquinity and heredity in producing the disease. Since that time the literature has been very very extensive, especially on the Continent.

The only branch of medical science wherein the importance of hereditary studies has been fully appreciated and wherein splendid work has been done during the last decade is undoubtedly ophthalmology. None can hesitate to admit that the main incentive towards this great achievement was the inspiration provided by Nettleship,[10, 11, 12, 13] Usher,[14, 15] Doyne[16] and Julia Bell[17] in 1922. The first question usually raised when heredity is under discussion is "What influence does consanguinity in the parents or ancestors have?" The issue really resolves itself into this question "Can the marriage of two consanguineous persons cause the transmission of a trait or defect which neither of them possess or does consanguinity operate by increasing the *hazard* of transmission of the same undesirable or desirable trait?" The results of all research in eugenics point to the fact that the outcome of consanguineous union depends entirely upon whether the particular disease or some heritable character is carried by both parents, by only one or by neither. However, Nettleship states that if the transmissable condition be very common there is as much chance of its presence in both of a related as that of an unrelated pair but any comparatively rare disease is more likely to be present in two cousins than in two unrelated persons. In most cases, using Mendelian terms, an hereditary disease is transmitted by the mating of an impure or hybrid dominant (D. R.) with a recessive one (R. R.) and if sufficiently large numbers are taken, and it seems that individuals affected by hereditary imperfections and diseases are very often members of large families, half of the resulting offsprings should be normal and half diseased whether the disease be the dominant or recessive partner. It is thought that representatives of hereditary diseases must often be far less ancient in origin than those representing normal characters and therefore presumably more readily modified by disturbing embryonic influences. Anticipation, or the manifestation of a morbid change at an earlier age in each successor or in each succeeding generation deserves much more attention especially in its relationship to the origin and extinction of hereditable diseases. This is a marked feature in hereditary glaucoma and Leber's disease. It is not a feature in retinitis pigmentosa. In families in which only a single example of the disease can be discovered, the disease may have existed in a latent form in several members but become manifest by some actuating illness, disease or toxemia. Nettleship's story in which the disease followed scarlet fever in five children in one family is most significant. In other discontinuous pedigrees there may be some other morbid state that affects an entirely different portion of the body—i.e., an hereditary equivalent.

Pathogenic Theories: There have been many recent pathogenic theories advanced. The liver dysfunction theory of Verhoeff[18] and Takahashi[19] the angio-spastic thory of Corrado,[20] vitamin deficiency theory of Levine,[21] the hypophysodiencephalic disturbance of Zondek,[22] of the ductless gland theory of Jones,[23, 24] the association of the vegetative nervous system by Yolin and Bedskiy,[25] the nutritional disturbance of Simson,[26] familial choroidal sclerosis by Cridland,[27] its relationship to familial amaurotic iodocy and Laurence-Biedl syndrome by Giannini[28] and by McCrae[29] and Weiss, its combination with Fröhlich's syndrome by Ricaldoni[30] and Isola, the abnormal course of the long ciliary arteries by Ehlers[31] or Crampton's[32] anomalous disturbance of retinal vessels all serve to illustrate the markedly divergent views and still they all tend to show their inter-relation with each other. Treacher Collins,[33] in his revolutionary paper believes that the process is one of primary degeneration of the neuro-epithelium resulting from a congenital lack of vitality—an abiotrophy and later an atrophy of the nerve fibers and an increase in the fibrous tissue elements. Verhoeff and Friedenwald[34] agree that the process is primarily a degeneration of the neuro-epithelium. This theory of abiotrophy is rapidly gaining momentum.

Symptoms: The three classical symptoms of retinitis pigmentosa which are generally diagnostic but not invariably present are night blindness, contraction of the visual fields and visible

pigmentation of the retina. Other characteristics are the slow progression towards complete blindness about middle age with the retention of comparatively good central vision even in the late stages. The disease is usually bilateral al-



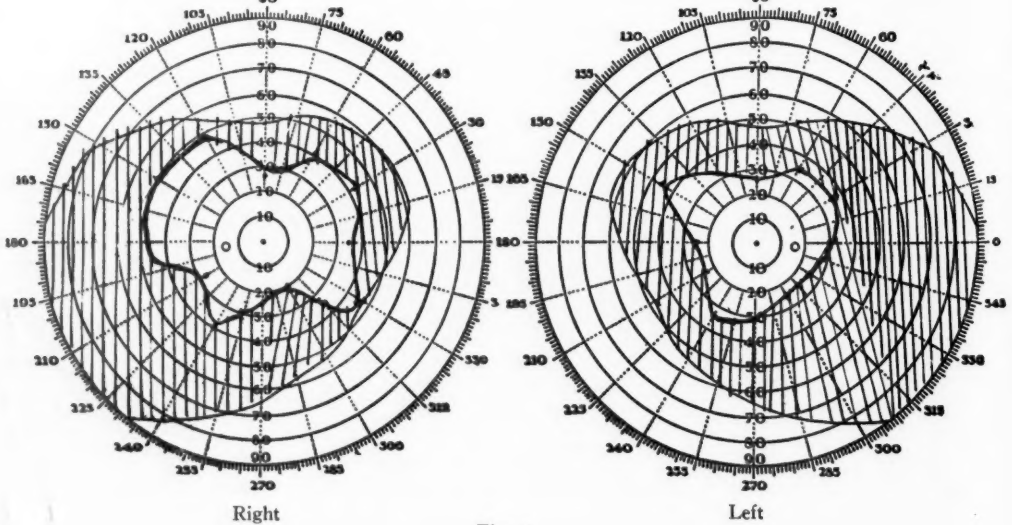
R. L.

Fig. 1. Fundus Photographs.

Fig. 1. The pictures of oculi fundi were taken by Dr. Wm. A. Mann, Jr., of Chicago.

though several authors[35, 36] have reported the disease in one eye only. Doyne[16] has unfolded other less recognized symptoms; the persistence of images and the preference for artificial light especially in far advanced cases. He also describes a zone of greyish infiltration immediately inside the main pigmentary zone and the fine layer of clouded vitreous lying immediately anterior to the retina. The fundus picture is very characteristic. The visible deposits of pigment having migrated from the pigment epithelium into the internal layers of the retina, collect chiefly along the blood vessels; when these branch a typical deposit is formed which has been likened to a bone-like corpuscle or to a fine web-like dispersion. Because of this migration the choroidal vessels become plainly visible, giving a tesselated appearance to the fundus. Cases are recorded in which the fields are contracted to the fixation point with defects of central vision without any visible pigment—retinitis pigmentosa sine pigmento.[37] However, more cases are described in which no pigment is seen on first examination but during the later stages[38] the usual deposition is seen. The determination of the exact form of the visual fields is difficult due to the varying results obtained at different times and under different lighting effects. Most authors now report a concentric contraction of the fields with ring scotomata being the usual rather than the unusual finding.

The information as to the age of the onset of the disease, the rate of progression and the age at which blindness occurs is very vague. From the examination of all possible reports the onset is at a very early age, in the majority of cases and is a rare occurrence after the age of twenty. Muncaster of Washington, D. C., in a discussion of Friedenwald's paper reports a girl aged eight



Right Left

Fig. 2.

Fig. 2. *Name*—Miss R. B. *Date*—March 26, 1934. *Radius of Perimeter* 26 cm. *Illumination*—Daylight, overcast day. *Test Object*—5 mm. White. *Co-operation*—Good.

with the disease. The accepted opinion now is that industrial blindness usually occurs at about middle-age. As to associated hereditary diseases we may conclude that retinitis pigmentosa occurs as a single affection seldom accompanied by other disabilities.[39, 40, 41, 42, 43]

Therapy: A variety of therapeutic measures have recently been advocated showing the marked and widely divergent methods of treatment. The liver therapy possibility of Carsten,[43] the cod liver therapy by Levine and by Santan-

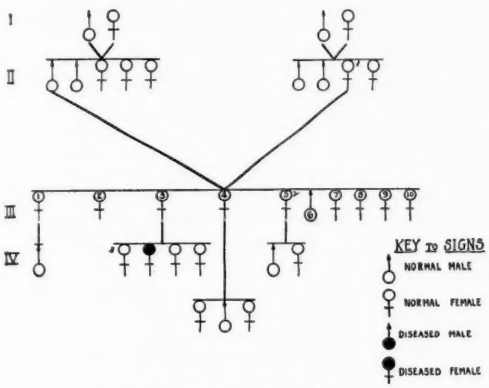


Chart 1. Genealogic Table.

CHART 1

1. Katherine S., grandmother of the affected child, had ten living children. Fundus examination revealed a circumscribed area of atrophy about 1 cm. in diameter in the infero-medial portion of the retina of the left eye. The right fundus revealed fine dust-like pigment at 7 o'clock about 2 disc diameters from the optic nerve.
2. Catherine Q. Aunt of child. Fundus examination revealed an anomalous deposition of pigment about 1 cm. in diameter at the first forking of the superior nasal vein.
3. Lavergne B., three-year-old sister of child. Mittendorf Dot of right eye.

owsky,[44] the organo-therapy and anti-syphilitic treatment by Hilgartner and Lankford,[45] Roentgen ray therapy by Merkulow and Schich,[46] the eyeball massage therapy advocated by Wurdemann,[47] the sodium cacodylate treatment of Muncaster,,[34] the acetyl-choline therapy by Corrado,[20] trephining by Mayon,[48] the treatment with menformon (female sex hormone) by Wibaut,[49] the ferronovin and hepatopson treatment of Ruge,[50] the use of amyl nitrite inhalation and nitroglycerine internally based on its dilatative effects on the retinal and choroidal vessels, the use of convex-concave lens by Ronne[51] and finally the most recent treatment of cervical sympathectomy reported by Meighan[52] and also by Campbell,[53] and lately by DeTakats.

W. H. Wilmer[54] in 1924 asks this question about hereditary factors in the development of retinitis pigmentosa: "After all is said and done, the question arises: 'How are these hereditary lesions to be prevented?'" The most important step seems to be the realization of these conditions by the medical profession, and through them and students of genetics and eugenics, the education of the public in regard to marriage and the hereditary dangers. Clarence Loeb,[55] thinking along the same lines, sent a form letter to 1,750 prominent ophthalmologists and superintendents of institutions for the blind asking them for their opinions. The following men have intimated by their answers that some system of classification must be evolved so that their answers might not just be termed "opinions." Prof. Axenfeld, Dr. A. Barkan, San Francisco, Dr. Ewing of Richmond, Va., Dr. H. Gifford, Omaha, Dr. Allen Greenwood, Boston, Dr. Robert Loring Boston, Dr. Casey Wood, Chicago, Dr. Wm. Posey, Philadelphia, Dr. A. Ewing, St. Louis.

Dr. L. Herbert Lanier,[56] writing along the same vein states "Of 29,242 blind persons interviewed for the government over 20% or more than one-fifth stated that their own blindness was due to congenital causes the nature of which was not indicated, as compared with a corresponding percentage of only 4 for those who reported none of their brothers or sisters as blind." Ophthalmologists have been stimulated by periodic articles on this phase ever since the time of Nettleship who, realizing the need for collecting and classifying all available information pertaining to the inheritance of eye disease, compiled his exhaustive study "On Some Hereditary Diseases of the Eye."[11] Therefore, from the foregoing data illustrating the many and variable hereditary factors and truthfully realizing the futility of all our temporary therapeutic measures should we not contribute our mite to posterity and with the aid of our state, county and city medical societies decree that ophthalmologists report to the Department of Statistics all cases of ophthalmic disease which are definitely and unequivocally hereditary. This classification would then be used as a sound basis for determining whether or not the propagation of

these diseases should be curtailed either by precept or by law. *In conclusion let us remember to treat is the word of the past; to prevent is the word of the present.*

REPORT OF A CASE IN A 6-YEAR-OLD GIRL

Miss Rose B. was the third born of four children. Before birth several types of abortifacient drugs had been used. At term her birth weight was 5½ pounds. She was breast fed for one month, never being considered a robust child. When but one year of age she developed a peritonsillar abscess; at the age of four, measles and at five whooping cough.

At this time, when five years of age the child would never remain out of doors at dusk because she would fall over people and objects. She attended another of our large clinics in this city, was refracted and a general physical examination given. Not being satisfied with the glasses, the child refused to wear them. The teacher notified the child's mother of the inability of the patient to see the blackboard whereupon she entered the Illinois Eye and Ear Infirmary. She was first seen by me in July, 1933. At this time she was poorly nourished and poorly developed, very pale and of a very dark complexion. She was very backward in her school studies. She is 3 feet, 8 inches in height, and weighs 38 pounds. A general physical examination otherwise proved that she was organically and mentally sound. Bone development was normal. Her hair was dark brown. Her eyes, R. V. 10/200, L. V. 10/200. She was refracted under atropine and R. V. -6.50 cyl. -2.50 ax_{18}, $=$ 20/65. L. V. -4.50 cyl. -1.75 ax_{165} $=$ 20/65. The corneae were clear. Anterior chambers of normal depth. Pupils were equal and reacted to light and accommodation. Irides dark brown. The media fairly clear, there being a slight lenticular posterior cortical haze. No pigmented areas on the sclera. Fundoscopically there was a dispersion of fine cob-web like pigment at the periphery and especially marked at the equatorial regions. This encroached centrally to within 15-20 degrees of the optic disc. The extreme periphery was relatively clear. The maculas were spared. The above correction is worn and is well tolerated.

LABORATORY FINDINGS

	Child	Mother	Father
Blood Wasserman	Neg.	Neg.	Neg.
Blood Sugar	96.1 mg.		
N. P. N.	25.2 mg.		
Uric Acid	3.0 mg.		
Basal Metabolism	+4		
X-ray Sella Tursica	Normal		
Urine Analysis	Normal		
Blood Count	90% Talquist		
R. B. C.	4,712,000		
W. B. C.	7,300		
Polym.	59%		
Lymph.	32%		
Mon.	9%		

Peripheral Fields are attached herewith. Central fields were attempted but due to the questionable cooperation, the results are not included.

The child is still under my observation; there has been no appreciable change in the fundoscopic picture, and is now attending a sight saving class.

A thorough search has been made of the fundi of all related persons—about 40—but no pathology could be found nor did I find any hereditary equivalents.

30 North Michigan Ave.

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DISCUSSION

Dr. Leo Mayer, Chicago: In addition to hearing Dr. Perritt's excellent abstract of his paper, I have had the privilege of reading the entire paper and I want to take this opportunity to congratulate him on this contribution. Dr. Perritt has taken a single case and developed out of it a contribution, the like of which has not been found in the literature since the epoch-making contribution of Nettleship, which established this English author as one of the outstanding ophthalmologic investigators. It is our hope that because of this initial maiden contribution which is of such high caliber we may anticipate further work of this character from Dr. Perritt in the future. I have little to add except to stress two or three points.

As Dr. Perritt said, in 1915 Mayou used corneoscleral trephining in the treatment, the idea being that this condition was due to some fundamental process which caused a decrease in the metabolism of the fundus. In 1929 Hepburn advanced the thought that retinal impairment might be at the base of the condition. This contribution was the one which induced Royle to bring forth in 1932 the idea of cervical sympathectomy, in this way decreasing the effect of the sympathetic action on the vessels which go to the head and allowing the supply of blood to the retinal tree to be increased. He opined at this time that this procedure causes a permanent and definite increase in the caliber of the retinal arteries, and he was very enthusiastic about the possibilities of this type of treatment. He also brought out the fact that the condition of retinitis pigmantosa must necessarily be diagnosed as early as possible in order that increased vascularity could be attempted.

De Takats, at Northwestern University Medical School, has operated on eight cases up to the present time with this procedure. I am sure that when his report is published we can look forward to it with some enthusiasm because of what he has told me of his work. Such operations have also been done by Wheeler in New York and other men in various parts of the country.

The enthusiastic report of Wibaut, on the use of menformon, is very interesting. He has assumed the premise that the female sex hormone is the factor lacking in the transmission of this sexlinked disease. This is comparable to the idea which has been advanced in the condition known as hemophilia. About four years ago, Dr. Luedde of St. Louis used retinal pigment emulsion for the treatment of retinitis pigmentosa. The idea was that the retinal pigment contained some factor of an immunological type which would prevent the retinal pigment from advancing into the outer layers of the retina. Dr. Luedde was kind enough to supply me with some of this emulsion, and at the meeting of the American College of Surgeons in St. Louis he made a brief report upon its use. It is very interesting to comment concerning the measurement of the visual fields of individuals under this treatment. Little islands appear in the periphery of the retina, which may have been there before, but certainly escaped notice. Also, in this condition, I have had occasion to find that even without any type of treatment these islands appear and disappear. Whether it is a question of poor technic or whether there is an actual change in the sensibility of the retina is difficult to answer. But I should caution anyone who deals with these cases to be careful about the appearance of these island, which would seem to show an increase in the size of the visual field, when they are only temporary changes.

The question of eugenics and the genetic side of this problem appear to assume some importance of late. In some states they have instituted certain hygienic laws to prevent the propagation of hereditary disease. This same question is now being discussed frequently in the German literature. Necessarily, it behooves us to study this condition and decide what attitude should be taken concerning the sterilization of individuals transmitting retinitis pigmentosa.

Dr. H. E. Middleton, Alton: I have listened with

interest to this discussion. I would like to report a case which was seen last summer, in July, a young woman of 15 with night blindness and diminished vision. The best vision obtainable was R. E. 20/100, L. E. 20/40. The fields were markedly contracted, and there was typical spider-web pigment distribution. Her father was wearing a very high correction, the best vision obtained being 20/20-1. There was a history of defective eyes of various vague kinds in the family history, and in one uncle, they thought, there was night blindness. I had refracted this girl three years previously and obtained 20/20-1 vision, with correction.

I live within twenty miles of Dr. William Luedde, and have known of his work with choroidal pigment emulsion using injections subcutaneously. He was glad to see the case and started on pigment injections. The case came back in about a month with improvement of the fields and increase in vision. She reads 20/20 shortly after the injection of the pigment, and then it gradually decreases until another injection is given. It is just about enough to hold her for about a week. He admits that his work is experimental but he has several cases with good results. The tests of visual acuity and the examination of the perimetric fields is after all a subjective one. It depends upon the reaction of the patient, and I am doubtful at times as to the accuracy of the test of reading letters.

Dr. Richard A. Perritt, Chicago: I have nothing to add, except that I wish to thank the men who have discussed the paper.

A MODIFIED TECHNIQUE FOR SUSPECTED GALL BLADDER DISEASE

ADOLPH HARTUNG, M.D.

AND

T. J. WACHOWSKI, M.D.

CHICAGO

The roentgen diagnosis of gall bladder disease at the present time is based almost entirely upon information derived from the cholecystographic method of examination. It is generally recognized that the findings disclosed by it are far more extensive and accurate than those obtained by the so-called direct and indirect methods in use prior to its introduction by Graham-Cole in 1923. Nevertheless errors in diagnosis based upon it occur with sufficient frequency to justify doubts of its absolute reliability. Improvements in technique and better interpretation gained by experience have resulted in increased accuracy but enough fallacies remain to warrant further study and experimentation to eliminate them or reduce them to a minimum. With a view towards ascertaining whether a cholecystographic examination combined with an apaque meal roentgen examination might result in a reduction of the percentage of errors in diagnosis we subjected all patients referred to us during the past year at the University of Illinois Research Hospital for suspected gall bladder lesions to such an examination. This paper is based upon 63 of these cases which were subsequently operated on at our institution and where we were able to correlate the roentgen and operative findings.

Before describing our method and discussing the results obtained with it, a brief resume of the methods commonly used, together with their limitations and chief sources of error, may serve to show why a combined method such as we are using may lead to greater accuracy in diagnosis.

The direct method of roentgen examination constituted the earliest attempts to utilize roentgen rays for gall bladder diagnosis. Positive findings were and are still considered of definite value. They consist of visualization of gall stones or of a gall bladder shadow on the plain film. Failure to show such shadows is generally regarded as having little or no significance. The possibility of showing gall stones is directly proportional to the amount of lime salts they contain and the care used in attempting to show them. Various operators reported positive results in from 5 to 90 per cent. of cases examined. Definite ring shadows, especially when multiple and faceted, are almost pathognomonic. Comparatively little value should be placed on doubtful shadows except perhaps as suggestive evidence indicating the need for cholecystographic study. As regards visibility of the gall-bladder on the plain film, there is considerable controversy as to the value which may be attached to this finding. It has been shown repeatedly by the dye test that shadows supposedly representing that organ have no relation to it. That the normal gall bladder may cast a shadow under especially favorable conditions has also been demonstrated. The contention that visibility always implies pathology has not been definitely established. Abnormal visibility may occasionally explain a persistent faint gall bladder shadow seen after cholecystography which fails to contract after the fat meal.

The indirect method of examination is based

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upon secondary signs observed in connection with an opaque meal roentgen examination of the gastrointestinal tract. Considerable importance was attached to it prior to the use of the Graham-Cole test and much of the information to be derived from it may be utilized to advantage even now in connection with other methods in use, especially in doubtful cases. Pericholecystitic adhesions, credited with producing dextroposition or hepatofixation of the pyloric end of the stomach or parts of the duodenum, or abnormal fixation of the hepatic flexure of the colon, were usually regarded as of major significance for the findings noted. Operative check-ups frequently contradicted the deductions drawn but confirmation was noted with sufficient frequency to warrant using the method as an adjunct to others. Smithies[1] made a study of 1,000 cases of surgically demonstrated instances of gall bladder disease from the Mayo Clinic and found 48.9 per cent. associated with adhesions to adjacent structures. Only 22.8 per cent. of these involved the duodenum and 10.4 per cent. the stomach but it is quite likely that many of the others might conceivably be responsible for roentgen signs similar to those produced by direct attachment. Compression of the duodenal cap or pyloric end of the stomach by a pathologic gall bladder producing a so-called "seat" was likewise found to be of value in some cases even if it was not found to constitute infallible evidence of such disease. Functional disturbances in the form of hypermotility or stasis, hyperperistalsis or spasm or irregular peristalsis resulting in to-and-fro movements in the duodenum, were frequently found associated with gall bladder lesions. They were however common accompaniments of other lesions but as the examination could furnish evidences of such lesions their presence, where no other explanation was demonstrable, furnished corroborative proof of considerable value.

The introduction of cholecystography marked a notable advance in the roentgen demonstration of gall bladder pathology. As is well known, it is a functional test depending upon the fact that tetraiodophenolphthalein compounds administered orally or intravenously are excreted normally with the bile and concentrated with it in the gall bladder to a degree producing sufficient radio-opacity to cast distinct shadows on the Roentgen film. Normal evacuation of the gall bladder in response to various stimuli was also demonstrable with it. Variations from the normal in the form of non-visualization, faint visualization, abnormalities of form, contour and position and abnormalities of emptying serve as a basis for the inferential diagnosis of gall bladder disease. In addition, stones of a non-opaque character otherwise invisible and even small tumorous masses might be recognized as negative shadows surrounded by the dye containing bile. In some cases of positive stone shadows, especially those of a doubtful nature, the test occasionally was of value in determining their nature. It soon became apparent that none of the findings disclosed by this method pointing to either a normal or pathologic gall bladder were infallible and this conclusion is generally admitted even at the present time. Particular techniques are credited with greater accuracy and check-up examinations in cases with doubtful findings unquestionably reduce the percentage of errors.

Normal visualization may occur if enough normal mucosa be present to produce the usual response in spite of the fact that the remaining parts may be sufficiently diseased to produce marked clinical manifestations. It is also conceivable that a gall bladder may recover from an attack of cholecystitis with more or less complete return to normal, at least functionally, but that sufficient pericholecystic adhesions may have formed to cause symptoms of which the patient complains. This is demonstrated by the fact that cases in which gall bladder drainage has been done, subsequently may show normal cholecystograms, as was the case in 2 cases we examined recently. One other factor which must be taken into consideration, is individual functional variation of unknown origin. It is hardly likely that the gall bladder differs from other organs where we know such variations exist and that the average time chosen after the dye administration is the optimum one for presenting the information wanted in that particular case. All of the facts available at the present time demonstrate that absolute reliability cannot be attached to most of the information which may be derived from cholecystography.

Statistical evidence recorded in the literature shows considerable variation as regards reliability. Moore[2], in a series of 416 cases which came

to operation where non-visualization was noted on the cholecystogram, records confirmation in 100 per cent. and in 167 cases with faint shadows in 98.2 per cent. Ferguson & Palmer[3] report non-visualization with positive clinical findings having proved accurate in 90 per cent. of cases operatively; on the other hand, faint visualization with positive clinical history yielded only 58.3 per cent. confirmed findings and where the history was merely suggestive only 14 per cent. Cases of good visualization without stones which came to operation for some other reason or other were found to be 98 per cent. correct. Fleming[4] states that 88.2 per cent. of operatively confirmed cases of gall bladder disease were revealed by abnormal cholecystographic responses but in 11.7 per cent. of cases where gall bladder pathology was found operatively normal gall bladder function as evidenced by the dye test was present. Graham[5] cites statistics of different authors which average 97.8 per cent. correct diagnosis in 446 cases of pathologic gall bladder and 74 per cent. in 115 cases with normal gall bladder. 147 cases of his own yielded correct findings in 97.28 per cent. Eusterman[6] states that a negative cholecystographic response, i. e., a normal gall bladder shadow, is the least reliable of all signs and this opinion gains added weight when consideration is given to the fact that comparatively few cases of this kind come to operation for confirmation. Whitaker[7] considers absence of shadows one of the most certain indications of abnormality and most observers appear to be of this same opinion. As regards gall stones, it is generally regarded that where they are demonstrated either as positive or negative shadows in connection with cholecystography, operation confirms them in almost 100 per cent.; absence of such shadows where operation reveals their presence is comparatively common so that no very definite reliance can be placed on this finding.

Following the introduction of the dye test, there was considerable discussion as to the relative advantages of this test over the direct and indirect methods of examinations formerly in use. Case[8], in common with many other workers who had had extensive experience with both methods, held that the former was clearly more reliable and informative but stated that he considered certain secondary signs still valid, as strongly suggestive of gall bladder disease. Oakman[9] in 1928 in an article on the correlation of cholecystography and the barium meal reports that in a series of 37 cases examined by the cholecystographic method, in 97.3 per cent. of them operation confirmed the roentgen diagnosis, whereas in 70 cases previously reported operation revealed a correct diagnosis in only 53 per cent. based on findings obtained by the direct and indirect examination methods. He adds however that in 143 cases where a normal cholecystographic response was obtained and no operation performed some showed indirect signs and that probably a portion of them actually had gall gladder disease. He mentions the possibility that a further study of indirect signs in connection with cholecystography and surgery might enable us to cut down the percentage of missed pathology and if so it would be worth while.

From the data presented, it would appear that cholecystography justifiably forms the mainstay of the roentgenological diagnosis of gall bladder disease. Nevertheless apparent contradictions between the clinical manifestations and conclusions reached on the basis of findings suggested by the dye test would seem to indicate that additional examinations are advantageous to render the roentgen findings more reliable. A preliminary direct examination might obviate the necessity for a cholecystographic study by showing unmistakable gall stone shadows. In the case of doubtful shadows the dye test might be of differential value. If an apparent gall bladder shadow were noted on such an examination suggestive of pathology, cholecystographic confirmation would be advisable and the findings might be valuable to distinguish such a shadow from faint visualization due to disease. The indirect method with its so-called secondary signs may serve to confirm the findings obtained by the other methods especially if they are of questionable nature. A combination of these methods not only gives all the information which any one of them alone can give but permits of checking the findings of each one against the other, which is bound to make for greater accuracy.

It is more than likely that each one of the methods named is used in connection with individual cases by most roentgenologists. The only claim we make for our method is that it has advantages as a routine procedure, that it is adapted especially for ambulatory cases to give the maxi-

mum information in the shortest time with a minimum of expense and in the case of hospitalized patients shortens the time necessary for making a diagnosis as far as the roentgen examination is concerned.

The actual procedure followed in connection with the 63 cases which form the basis of this article was as follows: In most of these cases the dye was administered orally and the patients were first seen by us after its administration. This precluded making preliminary films from which direct signs might be obtained. We feel however that this is of sufficient importance so that we intend doing it in future whenever possible. 14 hours after the oral or 6 hours after intravenous administration of the dye films were made and developed immediately. If they were satisfactory and showed a good gall bladder outline of approximately normal density the patient was given a meal consisting of egg yolks and cream. Otherwise additional films were made after an interval before the fat meal was administered. One hour after the fat meal, films were made to show contraction or other findings which might be of value. An opaque meal was then given under fluoroscopic control and special attention given to possible secondary signs. Subsequent examinations were made in individual cases where it was thought additional information might be obtained thereby. A written report was then incorporated with the history of the patient and if the patient came to operation this was compared with the surgeon's findings. No attempt was made to ascertain the exact nature of the pathology present when pathologic gall bladder was reported. Special stress was placed upon adhesions or other findings which might explain the roentgen signs observed. Of these, evidences of abnormal fixation, gall-bladder "seats" and functional disturbances were recorded although note was made if other abnormalities were present.

For purposes of study the cases are divided into 4 groups. Group 1, consisting of 8 cases, comprised those showing positive stone shadows. In all of these there was non-visualization of the gall bladder by the dye and all of them presented secondary signs in connection with the opaque meal. At operation stones were found in all of them but in 2 no evidences of adhesions were noted although our report suggested abnormal fixation. Group 2 was made up of 27 cases in whom non-visualization was the predominant finding. In these operation revealed stones or gall bladder pathology in 26 and stone in the common duct in one of them. Adhesions were found operatively in one case where no secondary signs pointing to them were noted and in two, none were present although evidences of them were noted roentgenologically. In Group 3 with 7 cases visualization was noted with non-opaque stone shadows. Operation disclosed stones in all of them but in only four were adhesions found which might account for the apparent secondary signs noted roentgenologically.

These 3 groups represent cases in which cholecystographic findings are generally considered adequate and reliable and they proved to be so in our series, showing 100 per cent. confirmation. As regards secondary signs, based solely upon adhesions noted operatively, there was a discrepancy of 25 per cent. in Group 1, 11 per cent. in Group 2 and 43 per cent. in Group 3 or an average of 26 per cent. in the 3 groups. No secondary signs were noted in 5 of the 43 cases in these 3 groups making an absolute discrepancy of about 12 per cent. in the findings.

Group 4 was made up of 21 cases where visualization occurred. In 9 of them it was considered normal, in 6 faint, and 6 showed some abnoramlity of shape, contour or location. 18 of them showed definite contraction after the fat meal. In one there was none and in two others it was questionable. At operation, stones or gall bladder pathology was found in 19, one was negative and one questionable. Five of them showed no adhesions but secondary signs suggestive of them were recorded on the basis of the opaque meal examination. In this group at least 50 per cent. would probably have been reported negative on the basis of the cholecystographic findings alone. Actually all of them were reported as showing findings suggestive of a pathologic gall bladder or findings consistent with a previous attack of cholecystitis with adhesions. From these findings it would appear that faulty diagnoses were made in about 10 per cent. of these cases as compared to a probable 50 per cent. if reliance had been placed only upon the findings obtained by the dye test. As regards adhesions to account for the secondary signs a

discrepancy of about 24 per cent. was present.

In reviewing the entire 63 cases from the surgical findings and roentgenological signs obtained by the combined method it would appear that correct diagnoses were arrived at in over 96 per cent. of the cases. In 42 of them probably the same conclusions would have been reached from the cholecystographic examination alone. In the other 21, secondary signs elicited from the opaque meal examination prevented errors in diagnosis in almost half of them which would have been made if the findings obtained from the dye test had been the sole criteria. It is interesting to note that 12 of the 63 cases were originally referred for gastrointestinal examination because of the clinical history and most of these were subsequently examined for possible gall bladder pathology on the strength of secondary signs noted which suggested the advisability of obtaining additional information.

Although the series studied is too small to be very convincing it would seem to justify the following conclusions:

A combined method of study such as described is of value in all cases of suspected gall bladder disease if for no other reason than to check findings against each other for corroborative purposes.

It is particularly valuable where findings obtained by cholecystography alone are questionable or at variance with the clinical manifestations.

It may prevent errors in diagnosis which would occur in some cases if the evidence presented by the dye test were relied upon exclusively.

It is applicable in cases where the dye test is of questionable value as for instance in the presence of jaundice.

It permits of the demonstration of pathology other than of the gall bladder which may be present simultaneously or which may be responsible for symptoms simulating those of gall bladder disease, without subjecting the patient to a separate examination.

It gives a maximum of information with a minimum expenditure of time, energy and money compatible with accuracy of diagnosis.

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DISCUSSION

Dr. David Beilin, Chicago: Unfortunately, I did not have a copy of Dr. Hartung's paper and, therefore, did not have an opportunity to carefully evaluate his paper.

Undoubtedly, a great deal of information may be obtained by the combined method of examination. There is no question that in many cases a barium meal examination may elicit some valuable information at the pylorus and duodenum which may be of help in making a differential diagnosis.

On the whole, I believe that cholecystography is a very accurate examination as is evidenced by the fact that the radiologist's roentgen diagnosis check with the surgical findings, in from 95 to 98 per cent of the cases.

I personally feel that the average radiologist should not be a faddist. It is all right to improve one's technic. If a surgeon were to change his technic or the management of an examination every time he heard something new, he would not get very far. Most of the practical surgeons usually try to master one technic, find out as many fallacies in the technic of the operation as possible, and profit by past experience, for, after all, hindthought is always more constructive than forethought. That does not mean I disagree with what Dr. Hartung has to say about his combined method of examination. I am sure most of us have done numerous combined examinations but not routinely.

I personally feel that an examination, where one can get from 95 to 98 per cent accuracy in roentgenologic diagnosis that will check up with surgical findings, is accurate enough, because the pathological manifestations are often such that it does not allow any further accuracy by any type of an examination.

I reported about 750 cases in the year 1930 at Los Angeles, in one of our radiological meetings. I at that time presented an exhaustive survey on the pathological gall-bladder as checked by surgery, and I believe that our statistics at that time (the statistics were compiled by interns, surgical resident, and resident in the radiological department) seemed to check with the accuracy and diagnosis at most large clinics, running somewhere around 95 to 98 per cent.

I think one ought to hesitate about being very definite

in telling the surgeon that there are adhesions about the gall bladder. In the early years of cholecystography, I used to state very often that, if I saw what looked like a persistent irregularity in a gall bladder outline, and particularly if the shape of the gall bladder was the same after the meal as before, there undoubtedly were pericholecystic adhesions, but after seeing hundreds of abdominal operations in patients who had had cholecystographic studies, and seeing that the gall bladder was not bound down, I became more cautious in making that statement.

However, if one sees a well defined deformity which remains deformed in approximately the same shape when a roentgenogram is taken in the posterior-anterior and the anterior-posterior views, and after a meal, say, (fifteen or twenty minutes after a meal) so the entire gall bladder does not empty out its contents, and you see a persistent, similar deformity, you can be safe in saying there are pericholecystic adhesions.

In regard to the gall bladder seat sign, I believe Ariel George spoke a great deal about this sign, and John Camp, at Mayo's did some work on trying to evaluate this sign. Camp found in a large number of instances that the deformity was produced by the lobe of the liver. I don't think that one can rely conclusively on the seat sign as being a gall-bladder shadow.

I do think that by the combined examination, from a clinical-roentgenological standpoint, if one has cholecystographic studies, with a complete examination of the gastro-intestinal tract, in order to exclude organic disease of the stomach, pylorus and duodenum, as well as the head of the panceras, and if one has excluded disease of the genitourinary tract, and if one finds an absence of the gall bladder shadow following the administration of the dye, one can say with great assurance that the patient has cholecystic disease.

Dr. Adolph Hartung, Chicago: I want to state that some of the things that have been brought out by Dr. Beilin have been answered at considerable length in the paper itself. However, I do want to make these points; first of all, cholecystographic findings are accurate where we get definite findings of either stones or non-visualization with proper technique. That is quite general knowledge.

Where, however, we get an apparently normal visualization with clinical manifestations pointing to gall-bladder disease, if we are going to rely upon our roentgenological findings alone, as derived from the dye test we are going to make a faulty diagnosis. That is exactly the type of case in which this combined examination is going to help us out. So that we do it routinely, because we do not know which is going to show us this, that or the other finding, but after the second set of films has been made, we make this opaque meal examination as a routine, if for no other reason than for corroboration. Frequently we do not need it, but if we do it oftentimes is of great value, as this series of cases demonstrated.

X-RAYS AND HEALTH

HARRY A. OLIN, M.D.
CHICAGO

Perhaps no subject in medicine is more entertaining or interesting than the field pertaining to x-ray. Its value is common knowledge to all doctors and yet, to most us, it is surrounded by a veil of mystery. Its birth is enshrouded in what properly can be termed the romance of medicine. When newspapers, in 1895, first printed the photographs of bones of living human beings, people little realized that the discoverer, Wilhelm Conrad Roentgen, gave to the world one of the most important and essential agents in the practice of medicine. This new method of actually seeing broken bones and the location of bullets was an amazing and progressive step in modern medicine; it injected real science into the practice of medicine and insured accuracy to accomplish the best results. It substituted honest judgment of fact for guess work, and quicker, better care and earlier relief of pain and discomfort for the injured person. Many people still hold the belief that the uses of x-ray are confined to broken bones and the location of bullets, but the science of x-ray has advanced far beyond the standards of 1895. The standards of 1895, today, serve only as a foundation in this comparatively new field of medicine. Today, not only can broken bones and bullets be subjected to x-ray examination but also all parts of the human body. In addition, with the aid of special substances, many internal organs can be studied and their diseases recognized by means of the x-ray.

The stomach and intestines are hollow organs which normally are not seen on an x-ray film but, by giving a special liquid meal, containing the purified chemical, barium sulphate, in water, buttermilk or any other suitable fluid, the contour, size, shape, etc., of the stomach and intestines are seen as shadows which conform to the outline of the organs. In the dark room these shadows are projected on a fluorescent cardboard called the fluoroscopic screen and in this manner the organs can be studied and their function investigated in the living person. The study of the heart and lungs requires no special method

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since the heart as a solid organ filled with blood, casts a dark shadow against the lungs which are hollow organs filled with air and which the x-ray penetrates as light shadows. The rhythmic movements of the solid organ, or heart, contracting and expanding can be readily observed in the *light* fields which are the lungs. Likewise, the expansion and contraction of the lungs may be studied and the excursion of the diaphragms may be seen during the alternate phases of breathing —expiration and inspiration. Changes in contour, size, shape and shadows foreign or abnormal to the organ are readily detected.

Certain substances, when injected into the blood stream, excrete these chemicals by the route of definite organs as the gall bladder and kidneys and by casting shadows, these organs can be visualized in this manner. The gall bladder may also be visualized by adding a chemical to the meal in addition to the method of injecting the chemical into a vein. Special methods are now in use where inert chemicals which cast heavy shadows and are impervious to the x-ray beam can outline body cavities and sinus tracts, the latter frequently occurring in chronic inflammation, as the chronic diseases of the bones and chronic wounds. Since 1895 millions of lives have been spared by the intelligent use of the x-ray and many thousands more can be saved by a yearly health examination or audit.

Preventive Medicine. To preserve its integrity and standing, every business organization or company conducts a yearly audit and examination of its affairs. This is compulsory, not because of its expense but because the examination renders a financial statement of the company's affairs and activities, to determine *its health and standing.* Its future is guided by this report. Similarly, an investigation of the health of the individual plays an important part in detecting hidden, symptomless or impending disease. To make this examination complete, the use of the x-ray is indispensable. The early stages of some diseases, many of which are very serious, because they produce few or no signs or symptoms may escape detection if the x-ray examination is omitted. Let me make this more clear by relating to you a recent experience.

A short time ago the superintendent of a building company fell from the first floor of a factory in the process of construction, a fall of about twenty feet He picked himself up from a pile of sand and timber apparently unhurt and resumed his work. That same evening he visited his family physician for a backache, presumably from his fall, and his doctor advised an x-ray examination of his back. The x-ray examination revealed no broken bones but a large stone was found in the left kidney which had become enlarged about one one-half times its normal size. Further investigation disclosed that this stone was blocking the flow of urine from the kidney to the bladder. Previous to the accident, the patient had experienced *no symptoms* referable to this kidney stone. The stone was removed and the kidney allowed to remain; the patient is now well with his kidney function normal. How long the stone had been present in the left kidney is not known by the physician or patient since no symptoms had arisen to cause him to seek his doctor. The fall on the back had necessitated an x-ray examination which by coincidence showed a stone. A yearly examination of the patient to include an x-ray study would have made the examination complete and would have shown the presence of this kidney stone. Fortunately this kidney was saved. The condition of this patient is called, in medicine, a silent stone, since it causes no signs or symptoms. A very frequent cause for removal of a kidney is prolonged obstruction due to a stone which blocks the flow of urine and results in so much damage to the kidney that it becomes a hollow sac filled with fluid, a condition which demands removal since it endangers the life of the individual.

We may have, in the body, other silent conditions besides a kidney stone, for example, a silent gall stone, a silent stomach or peptic ulcer, silent heart disease, silent lung tuberculosis, silent teeth abscesses, etc. A yearly health examination, to be complete, should include an x-ray study as it will disclose all the above conditions cited. Therefore the use of x-rays on people who "have never been sick a day in their life" is an intelligent step in the modern practice and development of medicine.

In the past the efforts of physicians were directed to the cure and treatment of existing disease and suffering. Many people still believe that, since they have no pain or special discomfort, they are free of disease. Very often, however, when pain and discomfort do appear, the disease is far advanced and hence much less can

be done. Disease does not always manifest itself by producing symptoms such as pain and fever. To avoid and check disease, modern medicine aims to prevent and detect diseases in their earliest stages. Hence an annual health examination is a progressive and important step in the detection of beginning disease.

In your yearly health audit or examination it is very important to see your physician first. Your family doctor knows you best. He possesses knowledge of your physical being gained by an intimate study of you covering a period of years and is best qualified to render sound judgment concerning your body. His recommendations are practical and appropriate to your case. For your own welfare it is wisest to carry out his suggestions as they mean the most to you. He believes in preventive medicine and if he desires information requiring the use of x-rays, he will send you to a competent, qualified physician specializing in this type of work. A qualified x-ray laboratory is always supervised by a physician especially trained and skilled in this type of work. Some people using the services of a commercial laboratory, operated by men who are not physicians and are untrained in the diagnosis of medicine, must have these services repeated. These x-ray examinations are usually inadequate and very frequently incorrect and hence unfortunately subject the sick person to added expense, which can be avoided in these trying times. Therefore follow the advice of your doctor when he recommends a physician who is an x-ray consultant.

Modern medical science has stamped out pestilence and plague and has added many years to the average span of life. The next big problem which demands solution is the maintenance of individual health. Statistics have shown that of the thirty-eight years which have been added to the average span of life, only ten years have been added to the lives of those who reach adult life. An individual of 27, therefore, can only expect to reach the age of 63. Although the general expectancy of life has been lengthened, there is need for much added improvement as the expectancy of life after an adult reaches thirty-seven has diminished in this country during the last ten years.

Preventable diseases *are* controllable. In the higher age group, cancer, heart trouble, kidney disorders, hardening of the arteries, etc., diseases which are controllable in their beginning take an appalling toll. I do not wish to infer that x-ray examinations, taken every year, are needed in all conditions to which reference has been made, but the value of your doctor's suggestions should not be discounted and that certain x-ray examinations are desirable for everyone to complete one's annual health examination and to obtain the greatest worth. Treatment, while necessary and valuable, is far more costly than the means of prevention.

6060 Drexel Avenue.

THE CONTROL OF UNDULANT FEVER FROM THE STANDPOINT OF THE VETERINARIAN

W. H. Welch, D. V. S.
LEXINGTON, ILL.

Comparative medicine and pathology is always an interesting and instructive study to physicians and veterinarians. It is the basis for practically all scientific medical advancement. Disease differs only in the species of animals attacked. Many are infectious or contagious to their kind; some are directly transmissible back and forth through different species that may be involved; others by reason of the consumption of flesh or other by-products of an infected animal; still others require an intermediary host, etc. There are many diseases once believed to attack only the lower animals that are now known to be directly transmissible to man, and in spite of the wonderful strides of medicine during the past century, future investigation will undoubtedly disclose many more of the lower animals and their diseases as representing in some manner yet unknown an actual hazard to human health. To the thinking scientist of today revelations of this character are considered still in their infancy.

A disease affecting the human which has been described in the past under a variety of names, but which is now universally accepted under the nomenclature of "Undulant Fever" has recently proven to be directly transmissible from animals to man. It is unnecessary to enumerate the various disclosures that led to the establishment of this fact. It is sufficient to state that undulant

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fever is now recognized as a condition in the human caused through contact with some of our infected domesticated animals, or through ingestion or contact with some of their infected by-products; that the etiological factor is an organism or germ which has been found in all our domesticated animals, the type of which varies slightly with the different species of animals which harbor it, but all believed to be descendants from a common parent strain; that 3 different species of animals, namely goats, swine, and cattle with the organisms harbored by them, known respectively as Brucella Mellitensis, Suis and Abortus, are generally accepted as responsible for the development of "Undulant Fever" in man, although inasmuch as these organisms are known to be directly transmissible to sheep, mules, horses, dogs, cats and poultry, we cannot with our present day knowledge of this disease as it affects our various animals, assert conclusively that these latter named animals do not represent a potential danger for the human.

Not being a laboratorian, it is my purpose not to enter upon any discussion of these various types or their relationship to each other, except as to their bearing on the practical control of this disease in the human. It is sufficient to state that in this Middle West climate where practically no milking goats are kept, we rarely discover the caprine type as being responsible for the development of undulant fever, except where the exposure has been of foreign origin. Even in localities where infected bovine herds are most numerous, the porcine type is the organism most frequently isolated as the etiological factor. This may be explained by the fact that of all the various types of this organism studied, the Bovine type may be considered the least pathogenic to the human, as well as being confined largely to the reproductive organs of the dam and discharged only around the parturition period. On the other hand the porcine type is recognized as having a more general distribution throughout the body of the infected swine, having been isolated from practically all the important glands as well as the bile, urine, feces and reproductive organs, dead feti and placentae.

Again this porcine type is not infrequently isolated from the udder of the cow, thus affording additional opportunity for both ingestion and contact exposures. Regardless, however, of the type of organism involved in the production of undulant fever, or whether caused by ingestion or contact it does not appear to be associated with any specific variation in the syndrome of the disease. There are many factors involved, however, that serve to classify it as resulting far more often from contact than from ingestion. We have plenty of convincing historical data as to the existence of bovine infectious abortion for centuries, yet in spite of the vast increase in both the numbers of infected animals and herds, there has been no proportionate increase in human cases traceable to that source. The enormous number of organisms consumed in raw milk during the past years without apparent ill effects, coupled with the fact that farmers and those persons frequently contacting animals in various ways (regardless of whether consumers of milk or other by-products) do actually furnish the largest percentage of patients of any group, would serve to indict it as an occupational disease. In cities the patients are almost equally divided between the sexes, but in rural districts the males predominate in the ratio of 8 or 9 to 1, again indicating the predominance of animal caretakers among the patients. Without doubt great harm has been done the dairy interests through the over-emphasis that is usually placed on milk or milk products during the investigation by the attending physicians as to the etiological factor in each individual case of undulant fever. Obviously the non-consumer of milk or milk products, or the consumer of pasteurized milk, must necessarily receive his exposure through contact with an infected animal or their infected by-products, or through contact with some animal that has associated with another infected animal and may be thus considered in the light of a mechanical carrier of the disease. Of this phase of exposure we know but little, but in those instances where the history recites no contact with farm animals, may I suggest that the dog and cat are two animals that possess a great propensity for the association of other animals; that they are consumers of milk; that not infrequently they feast on the placentae of infected cows, swine or their dead feti, or dead poultry or their offal; that they are killers and consumers of the carcasses of rats or mice that may have done likewise, or that they have been in intimate contact with infected animals or their

stalls. Furthermore has not the housewife who has trimmed a pork chop or a steak, helped with the grinding of sausage or hamburger, and accidentally included her own finger in the operation, experienced a greater exposure to undulant fever than has the constant consumer of infected milk who actually possesses a perfectly healthy alimentary tract? All branches of the medical profession are united concerning the value of milk in the daily ration, and should lend every effort to increase the consumption of good pure milk that is known to be perfectly safe for human ingestion. They should also recognize that a panic follows any announcement casting suspicion on the milk or water supply of a community and on investigating the origin of each individual case of undulant fever the matter should be approached in a diplomatic manner that will not frighten a consumer away from a supply that is believed to be perfectly safe.

In further consideration of the effect of association with animals in producing the largest group of patients affected with undulant fever, it was thought that the following data relative to veterinarians would be of interest since they doubtless as a group may be safely said to furnish the highest percentage of exposure that can be mentioned. During the veterinary conference at the University of Illinois, February, 1930, the blood of 74 veterinarians, 13 laboratorians, and presumably unexposed persons was tested by Dr. H. E. Hasseltine, U. S. Public Health Service, Washington, D. C., with the following results:

3 veterinarians gave positive reactions in 1:80 or higher.
5 veterinarians gave postive reactions in 1:10 to 1:40.
8 veterinarians gave partial agglutination 1:10 to 1:80.
Of 13 workers in animal pathology 1 positive in 1:160.
1 partial in 1:160.
1 partial in 1:40.
8 unexposed persons gave 2 partial in 1:10.
Huddleson of Michigan testing the blood of 49 practicing veterinarians found 15 reactors positive in 1:50.
6 reactors positive in 1:100.
3 reactors positive in 1:200.
4 reactors positive in 1:500.

Questioned as to past or present manifestations of the disease, only 3 gave a history of a symptom complex characteristic of the disease, yet 26 per cent. gave reaction in titers that is universally accepted as indicative of the disease. One had been affected with the disease in 1924, and in 1928 his blood still agglutinated 1:50, and the same titer was noted on this test in 1930; on the other two reactors it was 1:100.

In Denmark, Alexander Thomson reports 65 veterinarians who had practiced more than a year; 94 per cent. showed brucella infection. Five months after graduation 15 gave positive reactions, one of which was actually affected with the disease. Other results were:

16 bacteriologists showed 10 positive reactors. Out of
21 herdsmen, 10 reacted
21 milkers, 6 reacted
23 herd owners, 9 reactors
20 drovers, 1 reactor
10 milk testers in dairy stores showed 1 reactor
26 butchers showed 5 reactors
12 veterinanians as meat inspectors showed 4 reactors.

The above data suggests that in interpreting the results of the agglutination tests in the human some allowance must be made concerning the occupation of the patient if errors in diagnoses are to be avoided. Consideration must also be given to those diseases the blood of which is also agglutinated by the Bang antigen. That the laboratorian has accomplished a wonderful work so far in undulant fever none will gainsay, but that there is much desirable information to be acquired is quite evident.

With the veterinary profession the study and control of any disease whether sporadic, or infectious and contagious, is always directed from a purely economic standpoint, unless it be proven a hazard to human health in which case it immediately becomes a matter of joint concern to physicians, laboratorians and departments of public health as well. Since the beginning of the present century, bovine abortion infection or Bang disease has represented the most serious economic problem affecting livestock, and as such has received more study and investigation at the hands of our experimental scientists all over the world than has been accorded any other single disease during that time. We have therefore as a result learned much regarding the activities of the Bang bacillus in its relationship to bovine abortions, premature births, sterility, mastitis, calf scours, calf pneumonia, retained placentae and various diseases of the unborn feti, placentae and the reproductive organs of the dam, the etiology of which was due primarily to infection with the Bang organism. However, we regret sincerely that there is still very much

desirable information which we do not as yet possess. It is a matter of congratulation, however, that we do possess sufficient knowledge to enable us to eradicate this disease from our infected herds of livestock and to grow therefrom a herd free from the infection and to maintain them thereafter in that condition. The merits of the blood agglutination test, its limitations; the segregation of non-reactors and the procedure of raising the younger animals entirely free from Bang disease are facts fully attested by the numerous herds throughout the United States that have been officially declared as free from this dreaded disease and as a result are permitted by all the various state sanitary authorities to move inter-state and intrastate without restriction. There are 102 herds so accredited in Illinois alone, and approximately 1115 herd-owners who are endeavoring to eradicate Bang disease from their cattle in order that their herds may also qualify under the plan that is known as University Project No. 1046, and many thousands of other cattle not enrolled under this project have as a result of this educational work been tested and the reactors removed. Briefly stated this plan of eradication consists of conducting the blood agglutination test on the entire herd of cattle, goats or swine every thirty to sixty days, and removing all the reactors until a clean test is had, the work being done by veterinarians who have been officially accredited for that purpose. When two annual or three semi-annual tests have disclosed no reactors the herd is recommended for accreditation, the final test being checked by the State University Laboratory. It is a matter of congratulation that approximately one-fourth of all the practicing veterinarians in Illinois have spent their time at the University laboratory studying the technic of this agglutination test and have returned home to draw blood samples from their local herds, conduct the test and submit their findings along with duplicate samples to be checked by the State diagnostic laboratory in order that they may demonstrate their efficiency and become accredited for this work.

The control of any disease in the human that has its origin in the lower animals is easily stated—*Stop it at its source of origin.* While it is believed that the weight of evidence supports the contention that in the United States at least, undulant fever is most often contracted through contacting infected animals and their products rather than ingestion of such, we must necessarily recognize the potential danger that exists through the consumption of raw milk and its products, not only in undulant fever, but in tuberculosis, septic sore throat and other milk borne diseases. Eradication of tuberculosis in cattle was first agitated as an economic measure, but not until it was demonstrated to be transmissible to the human and a joint health problem did its eradication make progress. Likewise was Bang disease first prosecuted as an economic problem, but is now a matter of grave concern to all in charge of human health. The problem of mastitis in the dairy cow is now upon us and is no longer just a condition effecting the efficiency of the herd, it is a human health problem demanding our serious attention. Milk is the most universally used food commodity of mankind, and the public has a supreme right to know that every drop sold is perfectly safe for consumption. The first step in this procedure is to see that it is produced by healthy cows, and it is equally as essential to know that the conditions under which it is produced are sanitary. It should be impossible to sell to the public any raw milk except certified, and it should be as much a duty for food inspectors to know that it is *produced* under sanitary surroundings and handled in a sanitary manner prior to reaching markets as it is for them to see that it is kept under sanitary conditions just prior to its sale to the public. The problem of the eradication of tuberculosis in cattle is well on its way to completion, thanks to the combined efforts of public health officers and the medical profession. Co-operation is again needed in seeing that in every community the supply of milk is absolutely safe for human consumption.

DISCUSSION

Dr. Edgar C. Cook, Mendota, Ill.: I would like to ask if there is any cooperation between the Public Health Department and the Veterinarian Department in this State. I have reported three or four cases of undulant fever in the past year and was assured by the Public Health officials that the State veterinarian would investigate the herd but a year has passed and no one has shown up yet.

Dr. W. H. Welch, Lexington: I cannot say since July 1st, but during my regime as State Veterinarian, Dr. Andy Hall, Director of Public Health, approached me on this subject stating that he would investigate

the milk supply of each case of undulant fever reported to his office, and secure the signature of the owner of the herd, provided our department would send a man and bloodtest the cattle free of charge to the owner. In each instance, milk samples were also included and tested, and following the first trip, we also drew blood samples from all the swine on the farm, and in the later cases blood samples from the horses, and from about 50% of the matured poultry on the farms were also collected and tested. Those statistics are in the hands of the Public Health Department. Dr. McShane would have them.

Dr. J. J. McShane, Springfield, Ill.: I might answer by stating that we send a field man to investigate each case reported. He is supposed to obtain authority from the herd owner requesting that test be made. We can't force a test on any herd owner. The request must come from the herd owner himself, and this request is relayed to the Division of Animal Industry and they send a state veterinarian to make the test without any charge to the owner of the herd.

STUDIES IN TUBERCULOUS MENINGITIS WITH SPECIAL REFERENCE TO RACIAL SUSCEPTIBILITY

LEONIDAS H. BERRY, M. S., M. D.

CHICAGO

Introduction. It has been observed for years by clinicians and vital statisticians that tuberculosis has a higher incidence among the Negro population than among the white population taken as a whole. Studies have usually been made from group mortality statistics based on death certificates of enormously large groups from widely separated localities. Such are the studies of Dublin[1] of the Metropolitan Life Insurance Company and Sydenstricker[2]. Usually several or all clinical forms are considered together. It is my belief that much more correct and beneficial information on this subject of tuberculous mortality may come from studies of single clinical or pathological forms of the disease proven by autopsy, where the patients lived in approximate localities. It is generally held that acute forms of tuberculosis are characteristic of Negroes and that this fact is best explained on the basis of racial susceptibility. (Carter[3], Brock and Black[4], Pinner[5] and McCarthy[6].) It has been shown by Krause[7] that acute tuberculosis is a manifestation of tuberculo-allergy and not necessarily lack of resistance and that the two phenomena may or may not run parallel. The relationship of tuberculo-allergy and tuberculo-immunity and indeed the entire concept of immunity and resistance is as yet vague. Individual immunity and susceptibility to tuberculosis rest upon a much firmer foundation than any analogous phenomena determined by race.

Dublin (Op. cit.) says, "color does exert more or less influence—how much of this influence is due to "racial" immunity or susceptibility and how much to racial customs, economic status and environment is difficult to determine. The factor of "crossing" of white and Negro bloods also beclouds the issue, since the mulatto, the octoroon, etc. have both white and Negro blood, although they are classified as colored."

Pinner (op. cit.), investigated the matter of pathological difference of tuberculosis between Negroes and Mexicans on the one hand and whites on the other. He concludes that a fair percentage of Negroes show lesions which are practically diagnostic for the Negro and that there is a very definite difference between the disease pattern as it is seen in Negroes on the one hand and whites on the other. He further concludes (on the basis of post-mortem findings) that tuberculo-immunity, (a very vital phenomenon) is in Negroes inferior to that of whites. Rogers[8] and Bogen[9] concur in the opinion that there are no essential racial differences in the pathology of tuberculosis in colored and white patients. Bogen shows by morbidity and mortality rates that the difference can be accounted for mainly by the fact that Negroes generally apply for treatment later than whites. Pinner admits that environmental factors can explain the greater incidence but disagrees that they may account for the so-called pathological differences.

Pinner's material was partly from a sanatorium in Detroit and partly from a general hospital in Chicago. Included were cases in which the primary cause of death was tuberculosis, all clinical forms and all other cases in which post-primary tuberculosis was an incidental finding. His studies were largely the classifying of cases *a priori* into the categories of hematogenous, lymphogenous, and direct routes of spread. The cases showing the widest metastases at autopsy were assumed to have had the least "racial" immunity during life. These phenomena obviously varied according to whether there was a fatal tuberculosis or tuberculosis as an incidental finding. Another variation would

depend upon whether the fatal tuberculosis was chronic indurative, broncho-pneumonic, or Pott's disease terminating in a fatal meningitis, etc. The mechanism of resistance would be different in each of these cases, yet Pinner's conclusions were made on the basis of the mass analysis of all such cases.

The aim of this study is to make a detailed analysis of all cases classified under one pathological heading according to race, age and sex, in the same hospital, where clinical and pathological studies conform to the same standards and where the patients lived in proximate localities.

Etiology. Among 3,835 autopsies done at Cook County Hospital, January, 1929, to August, 1932, 505 had, as the primary cause of death, tuberculosis, all forms. Of these, 159 were tuberculous meningitis. Most treatises on tuberculous meningitis emphasize its occurrence in childhood and minimize its occurrence in adults. Our cases reveal many instances in adults in which no pre-existing clinical tuberculosis had been diagnosed, and autopsy findings were those of acute, so-called childhood types of tuberculosis with generalized miliary spread. Our studies show the greatest number of cases between the ages of 1 and 2 and a gradual decline to only 2 cases between 11 and 15 years. Then, there is a gradual rise to another peak around the age of 30.

When the cases are listed according to race it is found that 69% were colored, 25% white and 6% Mexicans. The greatest difference of racial incidence occurs in the children, i.e., cases below 12 years. There were 2.8 times as many colored as white adults and children; while there were 6 times as many colored as white children. On the other hand among the adults there were only 1.5 times as many colored as white. Thus, most of the colored cases, 61.8% were children while most of the white cases, 71.8% were adults. All of the Mexican cases were children. Part of the higher incidence in the colored group is accounted for by the fact that a larger percentage of autopsy permits are secured from colored patients than white at the Cook County Hospital; 42% of all autopsies are done on Negroes while there is a smaller proportion of admissions and deaths.

Tabulations listing predisposing factors in order of frequency, show that contact with tuberculosis led, with measles, otitis media, whooping cough and rickets closely following. In approximately half of the childhood cases contact history was elicited; 36% of those questioned gave a positive contact history. Whooping cough and measles are well known predisposing factors to tuberculous meningitis. Myers[11] found measles in 26% of his cases, whooping cough in 22%, otitis media in only 4% and rickets apparently did not occur in his cases. Rickets occurred in 10% of our cases, all of which were among colored and Mexican children. The frequency of otitis media (12.3%) associated with tuberculous meningitis is striking. Frequently a child had two or more of these disorders. In several instances it was possible to trace the development of tuberculous meningitis as an immediate complication of whooping cough or otitis media. Latent tuberculosis, i.e. Pott's disease and tuberculous hip disease pre-existed in 3% of our childhood diseases.

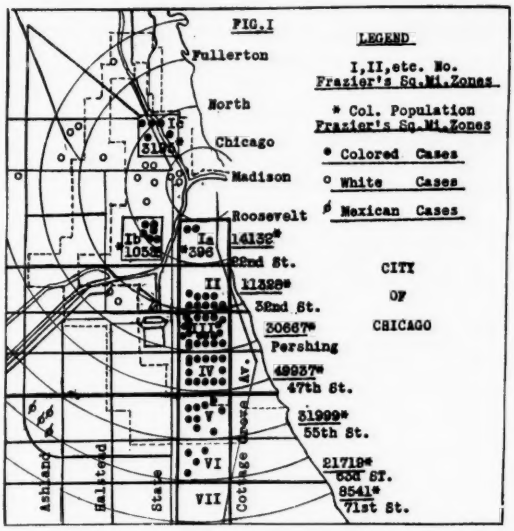


Fig. 1. Above map shows residences of 142 cases of Tuberculous Meningitis (Autopsies Cook County Hospital) within concentric mile zones from State and Madison Streets. The relation of Negro cases to Negro population in seven square mile zones is illustrated.

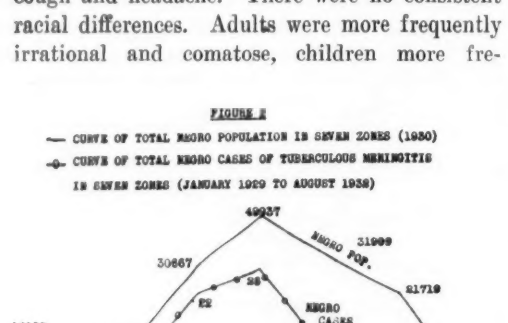
Symptoms and Physical Findings. The symptoms and physical findings were not different from those generally described. The onset was usually insidious with a few days of drowsiness, irritability, head-cold and anorexia with a slight fever. Suddenly there frequently developed vio-

lent headache, vomiting and gradual onset of stupor, rising temperature and pulse and neck rigidity. Detailed data were tabulated showing the frequency of symptoms, physical findings and laboratory findings in children and adults according to race. The 6 most constant findings in order of occurrence were neck rigidity, Kernig's and Babinski's signs, stupor, vomiting, cough and headache. There were no consistent racial differences. Adults were more frequently irrational and comatose, children more frequently had convulsions. Choroid tubercles were seen in only 3 cases, choked discs in 4, but many had impaired vision and photophobia in which no ophthalmoscopic examination was made. X-ray examinations of chests showed increased hilum shadows in 16 and miliary tuberculosis in 18 cases. Several cases with negative X-ray findings showed miliary tuberculosis at autopsy. There was a definite bradycardia among the adults on admission. This was only occasionally noticed in children. Admission temperature was roughly about the same, in children and in adults, the pulse relatively high in children. A marked terminal rise in temperature and pulse was present in 25% of children but only occasionally in adults. There were no apparent racial differences.

FIGURE 2

— CURVE OF TOTAL NEGRO POPULATION IN SEVEN ZONES (1930)

-o- CURVE OF TOTAL NEGRO CASES OF TUBERCULOUS MENINGITIS IN SEVEN ZONES (JANUARY 1929 TO AUGUST 1933)



1. *Duration of Symptoms:* The average duration of symptoms seemed a fair criterion upon which to base a clinical classification of acute, sub-acute and chronic cases. We found that all, or nearly all, cases which were clinically known to have chronic tuberculosis and in whom meningitis was merely the terminal event, had symptoms longer than 6 months. Those in whom tuberculosis was never previously suspected had histories of symptoms for the most part shorter than 6 months. Arbitrarily we divided them above and below six months. Those below were classified, acute and sub-acute, those above chronic cases. It was found that 92% were in the first group and showed an average of 3.5 weeks duration for the children and 7 weeks for adults. The racial groups were practically the same. The chronic group comprised 8% of the cases and roughly represented the group in which tuberculous meningitis terminated a chronic tuberculosis. In this group there were 2 colored children, with symptoms averaging 12 months duration. There were no white or Mexican children.

Laboratory Findings. Spinal fluid examinations were recorded in 91.4% of cases. Where more than one spinal fluid examination was done the one which was most diagnostic was selected for our data. Spinal fluid findings according to race in children and adults were tabulated. No constant racial differences were noted. The 4 most constant findings in order of occurrence were increased cell count (mostly lymphocytes), positive Pandy, increased pressure and clear appearance. The average cell count was 244 per cu. mm. Spinal fluid sugar was recorded in only 24 cases and showed an average of 35 mgm. per 100 cc. Hemenway[12] found tubercle bacilli in all her cases by special technic which was not used in our cases. There was one case of strept. viridans and another of pneumococci in spinal fluid cultures. Such combinations with tuberculous meningitis are reported in the literature. There was one case with normal spinal fluid pressure, negative Pandy and cell count of 15, 2 days before death and 3 days after onset of illness. It was evident from this study that a spinal fluid cell count may increase markedly within a few hours. In a few cases the clinical symptoms of tuberculous meningitis were markedly out of proportion to spinal fluid findings. Composite tabular records of spinal fluid cell counts total and differential were made. The average per cu. mm. for the various groups were as follows: colored children 232, adults 322;

white children 153, adults 310; Mexican children 205.

Pathology and Pathogenesis. There were no differences between the pathological changes of the brain and meninges in the respective race groups. 83% of the childhood cases and 63% of the adult cases were associated with an acute generalized miliary spread involving all or nearly all of the abdominal and thoracic viscera and often the pleura and peritoneum. The remainder presented no gross tubercles outside the meninges or a few scattered tubercles in one or perhaps two organs. The incidence of miliary generalization was 10% higher in white than in Mexican and colored children, while the adults were about equally distributed. Pinner (op. cit.) excluded generalized miliary tuberculosis in his study of propagation in the body or tuberculous metastases as an indication of racial resistance or lack of it. I do not think that an adequate study of this kind can justifiably exclude miliary dissemination. Pinner, however, estimates that miliary generalization was higher in his Negro cases. Here again objection may be raised because all forms and not a single pathological type was studied. In such a study a higher incidence of the signs of childhood tuberculosis in Negroes may simply mean that there was a greater number with acute tuberculosis in this group than among the whites in his series and not that there are pathological racial peculiarities.

100% of the children and 75% of the adults had extensive tuberculosis of the thoracic lymph nodes. The ulcero-caseous form was slightly higher among Negro children than white children, but slightly lower among Negro adults than white. There were a few more calcified primary lesions in colored children than white, while there were 1% more among white adults than colored. Jaffe and Levinson[13] reported a completely calcified primary lesion in a colored girl age 18 months.

The colored children and adults had more tuberculous bronchopneumonia than their respective white groups. White adults had more ulcero-caseous tuberculosis of the lungs while white children had less ulcero-caseous tuberculosis of the lungs than their respective colored groups. There were 14 cases in the childhood group with acute ulcero-caseous pulmonary tuberculosis. Most of these were colored children. Two cases, one a colored child, age 9 years, the other a colored child age 4 years, presented the anatomical picture of so-called adult type chronic ulcero-caseous pulmonary tuberculosis. The duration of symptoms were 14 months and 9.5 months respectively.

The mechanism of miliary generalization in tuberculosis and the factors which determine its occurrence in a group of cases are time honored subjects of discussion. The factors which may have been involved in the respective race and age groups of our series are too detailed to discuss here[14]. Suffice it to say that the doc-

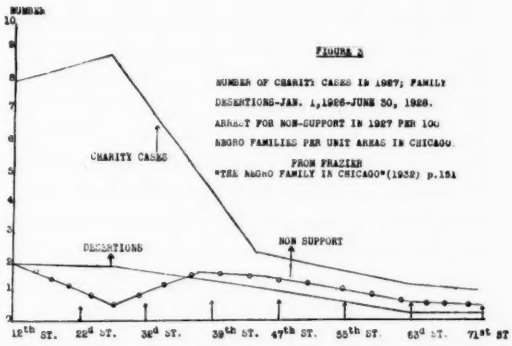


FIGURE 3

NUMBER OF CHARITY CASES IN 1927; FAMILY DESERTIONS-JAN. 1,1926-JUNE 30, 1928. ARREST FOR NON-SUPPORT IN 1927 PER 100 NEGRO FAMILIES PER UNIT AREAS IN CHICAGO. FROM FRAZIER "THE NEGRO FAMILY IN CHICAGO"(1932) p.151

trines of Weigert and of Krause are not entirely supported by the findings in our cases. The more recent conceptions of Rich[15] seem best to explain the facts presented. Rich has shown that allergy and the as yet obscure mechanism of immunity are separate and distinct entities, although they sometimes but not necessarily run parallel. The course of events in childhood tuberculosis is similar to those occurring in a previously non-infected experimental animal. The bacilli disseminate readily and multiply rapidly and unhampered as shown by Krause, Willis and others under conditions favorable to their growth. By the time resistance develops the number and virulence of the organisms in their favorable media may have greatly increased depending on the size of the original dose of infection, even though acquired resistance has developed. If the number and virulence of the bacilli have increased sufficiently they will continue to develop even in their unfavorable medium. It is a familiar fact that bacteria in test tubes will continue to grow in unfavorable

media if their numbers are great enough. Here we have allergy in presence of large numbers of tubercle bacilli which have by their growth increased their virulence. Acquired resistance has developed but with such large doses of infection it is unable to hamper the tuberculous process. The greater the original number entering the previously uninfected individual the more widespread their distribution. With wide distribution of bacilli in the body and allergy we have an explanation for the picture of acute generalized miliary tuberculosis with its massive involvement of lymphatics. This explains the condition as it occurs in children and in those adults who have not previously been exposed to infection.

Krause[16] has shown that there is a dose of reinfection and a spacing of intervals between reinfections that will depress and perhaps destroy, instead of building up immunity. It has been shown repeatedly in experimental animals, and clinically that no degree of acquired immunity in a susceptible individual is great enough to resist sufficiently massive doses of the specific infection. Thus an allergic, previously infected individual may have acquired immunity so depressed that the same state of relatively low ratio of immunity to allergy may develop that was described in young non-infected individuals. This we believe is a much better explanation for the higher incidence of acute tuberculosis in adult American Negroes than "racial" susceptibility. Economic and sociological surveys by Frasier,[17] Johnson[18] and Woofter and Associates[19] give concrete evidence that the majority of Negroes live under conditions of crowding, poor ventilation and poor incomes which are conducive to massive and frequent doses of tuberculous infection.

SOCIOLOGICAL ASPECTS

Isolated Groups and Tuberculosis. It has long since been observed that groups of people isolated from the great urban centers in America and Europe have a high mortality rate from tuberculosis when they immigrate into these centers. This has been observed in the case of Eskimos, Mexicans, Africans and others. There is much evidence that tuberculosis was unknown in Africa prior to the advent of European missionaries and tradesmen. Sorrel[20] found on the Ivory coast positive tuberculin tests in 20.9 per cent. of adults, while in Bornake a few miles inland only 2 per cent. During the World War army troops from French Colonial Africa had a much higher mortality from tuberculosis than native French or British troops, although the rate was increased among all groups. These troops had no evidence of tuberculosis before being transported.[21] This type of susceptibility is similar to that of any previously uninfected susceptible animal. The response is that of the "virgin soil" characterized by rapidly progressive, exudative reaction. It is not due to racial characteristics for it affects in like manner islanders of Mongolian extraction and the nomadic Jew of the desert of Arabia. The latter group after centuries of urbanization prior to their dispersal and exile now give a negative tuberculin reaction and die in large numbers of acute tuberculosis upon returning to Jerusalem from their habitation in the Arabian Desert.[22] However, Jews who continued to live in cities have a comparatively low tuberculosis mortality rate in nearly all centers of the world.

Immunologically, the American Negro probably does not belong to these groups of entirely isolated peoples, for he has had intimate contact with American whites for more than 300 years. Zeligs[23] finds that the number of positive tuberculin reactions among non-tuberculous children is even higher among American Negro children than among American white children. The few cases in our series are in agreement with Zeligs' findings. Bogen[24] found in 555 cases, of which 361 were white and 229 colored, that 55 per cent. white and 53 per cent. colored had easily demonstrable primary tuberculous lesions at autopsy.

Prior to the civil war the tuberculosis mortality rate was higher among white people than Negroes after 200 years of contact between the two races.[25] This is shown by mortality records from Charleston, Mobile, New Orleans and other cities between 1822 and 1865. An enormous increase in the Negro rate occurred immediately after the war when four million ex-slaves were suddenly thrown upon their own economic resources. The rate greatly exceeded the white rate. While diagnosis was not as accurate prior to the Civil War as at present, diagnostic facilities were the same for both groups.

Nationality and Tuberculosis. Another fact

which tends to dispel the theory of inherited racial immunity and susceptibility to tuberculosis is the marked variation in the incidence among national groups of the same race. Flick[26] showed in 1908 that the tuberculosis mortality rate for Ireland was 2.15 per 1,000. Austria, with a very old history of urban communities and a mixed Caucasian population had a relatively high rate of 3.36. In America, where the standard of living at that time was much higher than in most European countries, the rate was 1.69. In Jamaica where the population was 90 per cent. Negroes in contact with European civilization for three centuries, the rate was 1.53. When people of any nation are grouped according to city and country dwellers, rich and poor, indoor and outdoor workers, etc., the tuberculosis incidence varies just as much and sometimes more than when grouped according to race. Among Jews who have a much lower tuberculosis mortality than any other national group, there is considerable variation within this group depending upon economic status. In 1908 the mortality rate in the districts of the lower east side of New York almost entirely poor Jewish artizans averaged 12 per 1,000 population. In Harlem where mostly Jews of the business, manufacturing and professional classes lived, the rate was only 3.6. Among Berlin Jews, an economically prosperous group, the rate was 9.81 per 10,000, while in Budapest where they lived under very poor circumstances the rate was 21.93.[27]

Urbanization and Tuberculosis. Much has been written about urbanization and its immunity conferring powers against tuberculosis. The universally low incidence among Jews and their history of 2,000 years of urban life are cited in support of this hypothesis. Other groups have been urbanized for centuries but not nearly as long as Jewish people. There is the question of whether a group of people by sufficiently intimate social intercourse with a pre-existing urban group during the last few centuries may not be as thoroughly tubercularized as others of a much longer history of urban life. Theoretically, it may be possible to conceive of an inherited immunity to tuberculosis and the passing down from generation to generation in an urban community of a rugged "resistance" to tuberculosis. Practically, however, the proof has not been convincingly demonstrated. Healthy-born infants of all racial or national groups give a negative tuberculin reaction, prior to exposure to tuberculous infection in their environs. No child is born with a positive tuberculin reaction unless it is also born with tuberculous disease. Our only evidence of "tubercularization" in non-tuberculous individuals is the positive tuberculin or other such tests and the healed primary lesions demonstrable at autopsy and sometimes by x-ray. Urbanized adults of any race, whether of recent or remote urban ancestry may have primary infection and the immunity which it confers. Acute tuberculosis is not proof of the absence of this immunity, since we cannot always determine with accuracy the absence of massive infection, high virulence and predisposing factors. Opie[28] assumes that American Negroes do not get childhood infection and hereby accounts for the high incidence of acute forms in adults. Bogan (op. cit.) Zeligs (op. cit.) and Pinner (op. cit.) have pointed out that they get childhood infection perhaps more frequently than American whites, as attested by the high incidence of positive tuberculin test in children and healed primary lesions in adults. This evidence of exposure even in individuals of recently urbanized ancestry points toward acquired immunity, if one accepts the well established view that these first infections are the means by which immunity is acquired. The length of time necessary for the development of immunity after primary tuberculous infection in man has not been accurately determined. Rich (op. cit.) finds this period to be about 2 weeks in guinea pigs of average weight inoculated with large doses of tubercle bacilli. Human beings probably require longer periods but probably not hundreds or thousands of years. According to the most widely accepted views, if immunity is not developed with the first infection, progressive and fatal disease ensues. In this case the tuberculin positive child would have clinical evidence of tuberculous disease and the adult at autopsy would have no evidence of a healed primary lesion.

A Community Experiment. The residential sites of our cases were plotted on a spot map of the city (Fig. 1) to see if any correlation could be made between the incidence of tuberculous meningitis and the incidence of certain indices of social and economic status. Tuberculous meningitis being an acute infection and since

the average duration of illness was 3 to 7 weeks in 92 per cent. of our cases, it is highly probable that they acquired their fatal infection or their fatal predisposing factors in the environs of their last address.

The white group was widely scattered but for the most part came from households just on the outskirts of business and industrial districts in the areas of the lowest rent and income levels. The relatively small number of cases could not profitably be studied according to nationality grouping such as Polish, Irish, Italians, etc., nor according to economic zone. However, the majority of the white cases fell within a radius of three miles from the center of the business district. The Mexican distribution was in similarly disorganized areas.

The relatively compact distribution of the Negro cases made this correlation study more feasible than in the case of the whites or Mexicans. 90 per cent. of the Negro population in Chicago, approximately 190,000 people, live on the south side in an area approximately 7 miles long and 1.5 miles wide. Sociologists have found that the processes of social selection and differentiation have taken place within this group just as it has within the population as a whole. Similar observations have been made among Irish, Polish, Italian and other national and racial groups.

Frazier (op. cit.) applied to the south side Negro community the gradient theory of urban expansion (Burgess, E. W.) according to which changes in poverty rates, home ownership and other community variables may be said to proceed in successive square mile zones, which may be represented by concentric circles from the center of the city. (Fig. 1.) Thus Frazier divided the "black belt" into 7 approximately 1 square mile zones between 12th and 71st Streets, north to south and Cottage Grove to State, east to west (Fig. 1). He found that economic status and the better elements of social organization in general increased from the northernmost end nearest the business district southward. Such economic and social indices as the rate of charity cases, desertion, juvenile delinquency and non-support were highest in those zones nearest the center of the business district. These zones had lowest incomes, poorest housing, largest families, highest degree of illiteracy and most recently migrated families. Conversely these indices were lowest in the southernmost zones which had the highest incomes, best housing, no illiteracy, etc. The degree of family disorganization was directly proportional to the economic depravity of the community and inversely proportional to the degree of economic improvement in all zones. When some of the rates were computed for the Negro group as an undifferentiated mass and compared with similar rates for whites as a whole, the rates were higher for the colored group. However, when studied by the comparative zone method described, the rates were the same for similar elements of the white and colored groups. Figure 1 shows the distribution of colored tuberculous meningitis cases in the successive zones of Frazier in the south side Negro community. These cases fall in areas of highest percentage of rented households, low income levels and relatively high rent. The ratio of the number of tuberculous meningitis cases to Negro population decreases in the successive zones from 12th to 71st Street, as shown by Table I.

It may be seen by reference to Table I that the largest number of cases in proportion to population fall in zone I. There is a gradual decrease in the successive zones southward in the case rate per 10,000 Negro population, so that in zone VII where the social and economic status of the colored population is very good there are no cases. Fig. 2 shows a logarithmic curve of the number of cases in the successive zones north to south compared with the population curve. They are exactly the same type and there is a gradual increase in the distance between the curve in the center of each zone. In other words the case curve falls at an increasingly more rapid rate than the population curve. The increasing distance between the curves in the successive zones is a measure of the greater rate by which

TABLE 1.—DISTRIBUTION OF COLORED CASES IN SEVEN ZONES WITH CORRESPONDING COLORED POPULATION

Zones	Tuberculosis Cases	Negro Population	Rate per 10,000 Negro Pop.
I	13	14132	9.2
II	9	11328	7.9
III	22	30667	7.1
IV	28	49937	5.6
V	11	31999	3.4
VI	6	21719	2.7
VII	0	9117	0.0

the cases decrease from north to south. Correction for age groups 15 years and above and below 15 years (with 1930 census) does not materially change the curve.

The gradual fall of the tuberculous meningitis incident curve from north to south is exactly comparable to Frazier's curves of poor housing, over-crowding, recently migrated families, juvenile delinquency, etc. Figure 3 shows Frazier's graph of rates of charity cases, desertion and non-support in the south side community during the same period when most of our cases lived in that community. The tuberculous meningitis incidence curve is inversely proportional to Frazier's curves of home ownership, old migrant families, northern-born residents, business and professional classes, etc.

These facts are presented to illustrate a method of study by which a more accurate evaluation of public health data and vital statistics may be made. We have little doubt that similar studies on a larger scale would show the fallacy of many widely accepted conclusions and generalizations. Although our cases may be said to be selected, coming from the Cook County Hospital, the factor of selection is not as important as it may seem. Death certificates for Cook County show that in 1929 there were 32 Negro deaths from tuberculous meningitis, 33 cases in 1930, 37 cases in 1931. The figures for the first six months of 1932 were not available. Taking 34 as a yearly average of our cases, it is evident that we were dealing with 80% of all the Negro cases occurring in Cook County during the period studied. This may be accounted for by the fact that because of limited hospital facilities for Negroes elsewhere in Chicago they constitute an estimated 30% of County Hospital patients but only 4% of County population. Secondly, suspected meningitis cases are frequently shunted from other hospitals and homes to the County Hospital where there is a contagious department.

CONCLUSIONS

1. There are no differences between the history, symptoms, physical and laboratory findings of tuberculous meningitis in colored, white or Mexican patients.

2. There are no consistent differences in the primary or associated pathology between the races in the respective age groups.

3. There are definite and consistent differences between the associated pathology in children and adults without respect to race.

4. There is a much higher incidence of colored cases of tuberculous meningitis than white in our series.

5. In relation to the total post-mortems done, Mexican cases rank highest, colored intermediary and white cases lowest in the incidence of tuberculous meningitis.

6. There is evidence from the experimental community study and from other sources that there are differences of tuberculosis incidence within the Negro group which are just as great as differences between Negroes and whites, and that these differences may be explained entirely by environmental factors.

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4214 Vincennes Ave.

MORBIDITY AND MORTALITY IN PROSTATIC SURGERY

C. Otis Ritch, B.S., M.D., F.A.C.S.
CHICAGO

The subject of prostatectomy may again be broached now that resection is settling into its proper level and relationship; and many who were carried away by their enthusiasm are again studying the prostatic with their usual sound clinical judgment. As so often happens in medicine in well publicized procedures, too much was expected and demanded of resection. An accurate knowledge of the basic pathological changes in certain instances was submerged in an unaccountable enthusiasm. Too often all and every type of prostatic obstruction was submitted to resection, when a proper selection of cases would necessarily have relegated a certain definite proportion to resection and another portion to prostatectomy.

Lowsley reports about ten per cent. mortality in resection, which is about the average among capable surgeons. Other perfectly reliable statistics are reported with noticeably lower mortality rates. But in the main, the above percentage is probably an average one. In analyzing statistics it is well to bear in mind, among other things, the selection of cases, if any, and the postoperative follow-up. The operation of total removal, prostatectomy, should be followed by a much lower mortality rate than ten per cent. Personally, I believe it should be in the neighborhood of one per cent. But more concerning this later.

In many instances where the results are not published the morbidity and mortality rates are far from laudatory. This is quite evident when one realizes the number of men attempting this work who are in no particular trained in transurethral vesical instrumentation or surgery. Certainly, unusual consequences should be expected when the examiner cannot distinguish the interureteric ridge from the neck of the bladder; or the vera montanum from an hypertrophied middle lobe. Mishaps have been too common to be lightly dismissed. Burning a hole in the floor of the bladder and into the rectum; or burning through the urethra into the rectum are not things one takes sufficient pride in to report. Destruction of the tissues down to the periprostatic or perivesical areas with consequent cellulitis is more commonly heard of. Still more common are those patients upon whom a resection has been done without benefit or relief, and who present themselves for a secondary prostatectomy. Needless to say, most of these were ill-suited for a resection and should have had a prostatectomy in the first place.

There is no question but that resection is the operation of choice in certain definite types of obstruction and prostatectomy in others. The surgeon who advises one or the other indiscriminately and exclusively, without due consideration which type will give the individual patient the most relief, will have less brilliant results than had he employed the particular method for the particular case.

It is universally agreed that in fibrosis of the bladder neck, bars and collars, resection is the method of choice. In the smaller lateral or middle lobe obstructions there are many advocates of either method. Each has his own particular ideas of the manner in which these should be handled. But in the large adenomas, the immense middle or lateral lobes, the best results are obtained by prostatectomy.

Adopting the method suitable to the individual patient rather than adapting the patient to a favored method of operation, will materially reduce both the morbidity and mortality in prostatic surgery. Both are likewise appreciably lowered by the proper pre-operative preparation of the patient, as brought out in a former communication.[1] The surgeon in charge must be thoroughly familiar with every detail concerning his patient, from the time of admission to the final discharge from the hospital. In this manner one is able to anticipate and forestall many complications and sequelae, and to institute

treatment in still others before much progress and development of the complicating pathology.

The incidence of pulmonary emboli, infarction and septic pneumonia is noticeably lower where one exercises proper regard in the handling of tissues. Traumatism with subsequent infection plays a prominent rôle in the causation of complications. One of the prime objections to resection in the moderately large and the immense types of prostate is the considerable amount of traumatism to the tissues. Objection may be raised to this statement by comparing the condition with that present in the prostatic bed following a prostatectomy with a hemostatic bag or pack, which is very conducive to sepsis. However, I[1] decry the use of either except in those rare instances of active hemorrhage. They may safely be dispensed with in practically one hundred per cent. of cases. Probably less than one per cent. and certainly less than two per cent. require such an agent. The two preeminent objections to a hemostatic bag or pack are the probability of infection of the prostatic bed and the excruciating pain and tenesmus suffered by the patient. Secondary hemorrhage results from infection and a tortuous or fibrous urethra is more apt to occur where a mechanical hemostatic agent has been employed.

Diathermy hastens healing in the prostatic cavity and is frequently beneficial. It is likewise useful in seminal vesiculitis which is not an unusual postoperative complication. Those cases of frequency and dysuria due to infection and inflammatory changes in the prostatic cavity are materially helped by diathermy treatment. It is valuable to hasten control in cases of incontinence of a temporary nature and frequently aids in alleviating this distressing condition in the permanent variety.

"The prostatic cavity fills in with fibroblastic tissue whose nature and position render it extremely liable to infection. Complaints of suprapubic pain, perineal discomfort, testicular pain, painful erections, pyuria, dysuria and vague joint and muscular pains may frequently be traced to an infected prostatic bed. In control of these diathermy has proved of value."[1]

No place in the whole of surgery is the need, in general, of blood transfusion so palpable as in prostatic surgery; and probably nowhere else is this need so terribly neglected. The economic condition of the patient plays a rôle in some of these; but when one sees the general surgeon called in to do the comparatively infrequent transfusions that are done, then one naturally concludes that the urologist has not been trained to do transfusion and has not troubled himself to learn the rather simple technic of the procedure. It is a terrible indictment of the urologist. It has already been remarked that the mortality rate in prostatectomy should be in the neighborhood of one per cent. Blood transfusion plays the stellar rôle in reducing the mortality as well as the morbidity rate. These individuals are always elderly, if not distinctly aged and debilitated, prime conditions for innumerable complications, many of which can be entirely warded off by the repeated use of blood transfusion, frequently by only one. The loss of appetite, lethargy and debility so common following prostatic operations are forestalled by the early use of transfusions and alleviated by their tardy use. It is indeed most gratifying to the surgeon to see the almost immediate animation and sprightliness, and the restoration of appetite and feeling of well being enjoyed by the patient following the injection of a few hundred cubic centimeters of blood. I might add that small transfusions or intramuscular injections of 40 or 50 c.c. of blood have a decidedly beneficial result.

The liberal use of blood transfusions has a distinctly favorable result in lowering the incidence of morbidity and mortality in prostatic surgery.

Conclusions. In reducing the morbidity and mortality in prostatic operations one must have a thorough knowledge and appraisal of the individual patient. Sound clinical judgment must be exercised in the selection of cases for particular types of operation, as well as in the management of the patient from the time of admission to final discharge from the hospital.

Diathermy is of value in certain of the troublesome sequelae.

No other one thing helps maintain a low mortality rate as does the liberal use of blood transfusions.

55 East Washington Street.

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SURGICAL DRAINAGE IN GLAUCOMA

MICHAEL GOLDENBURG, M.D., F.A.C.S.
CHICAGO

Although we have learned much about glaucoma in the last 10 years, the problem of drainage is still debatable.

If we accept the modern concept, that the source of the aqueous humor is the intra-ocular capillaries, we must also concede the ability of this fluid to return to this seat of origin. Most of us, however, insist that the drainage angle, that is, the meshwork and canal of Schlemm is the most important avenue of aqueous escape. Assuming these factors to be true in the normal eye and conceding further that specimens of glaucomatous eyes examined microscopically all show evidence of closure of this angle, with peripheral iris adhesions and collapse of the meshwork in this region, we may grant for the sake of argument that such enucleated eyes invariably indicate a very late stage of glaucoma that is no longer amenable to medicinal or surgical aid. We must concede that between this stage of extreme pathology and the probable stages of pathology existing in the average case coming under observation that many degrees of severity may exist. We all concede that the anterior peripheral iris synechia interfere with the function of the canal of Schlemm. Let us presume for the purpose of illustration that such peripheral iris synechia exist in the region of from 12 to 3 o'clock on the dial, and let us assume that as a result a decrease of function of the canal of Schlemm follows to the extent of about 25 per cent. disregarding for the moment the possible compensatory avenues of fluid escape. Let us now presume that in addition to the synechia from 12 to 3 o'clock there also exist synechia involving the area from 6 to 9 o'clock which we will assume decreases the canal function roughly 50 per cent. Thus we may presume that every degree of disturbed fluid escape from 1 to 100 per cent. could exist.

From a clinical standpoint we may presume that the interference with canal function would also be influenced by the type of synechia present, whether they were recent or old, pointed or flat, this we have no way of ascertaining definitely. We do know that such types of posterior synechia exist in the pupillary area and we also know that if such synechia involve the entire pupillary area that a balooning forward of the iris in the formation of an iris bombe and secondary glaucoma follows. We also know that a normal iris may be cut without the production of exudate that will result in adhesions, but it is only exceptionally true in an iris that has been subjected to repeated inflammation and congestion. We also know that much may be accomplished with synechia in the pupillary area if carefully manipulated, due to the fact that sufficient space is present for retraction or contraction of the severed iris. But in the drainage angle the regional anatomy is such that even if we were able to separate the synechia, retraction of the iris would encourage their reformation; contraction of the iris should accomplish the desired effect which in a measure may be brought about by miotics.

We must presume from the microscopic evidence that synechia exist in every case of the chronic congestive type of glaucoma. In just what part of the iris circumference these synechia are located is difficult to say. One may obtain some idea of their location by the use of the Troncoso gonioscope, but this instrument never acquired the popularity that would seem indicated.

We may judge by the clinical history and course and the response of the glaucomatous eye to the use of miotics the extent and nature of these peripheral synechia. We may presume in a case that does not respond favorably to miotics in a reasonable length of time, that the synechia present occupy a good part of the circumference or that they are of a type that seriously interfere with the functions of the drainage angle. In a case that responds readily and favorably to miotics that the opposite is true.

In the average case of the noncongestive type with an apparently normal anterior chamber which responds readily to miotics and such other attention as may be indicated, very few if any serious peripheral iris synechia are present.

Granting these factors in general to be reasonably true and accepting them as a formula for a working basis, we may next outline what we are trying to accomplish by a surgical procedure.

In general one may say that all surgical interference so far devised for the purpose of reduc-

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ing the intra-ocular pressure in glaucoma may be divided into two classes: First, those that have for their objective the reopening of the natural avenues of fluid escape, namely, the meshwork and spaces of Fontana that lead to the canal of Schlemm, e. g., the various iridectomy operations, cyclodialysis, etc. Second, the decompression operations that attempt to divert the fluids in the anterior chamber to the extraocular subconjunctival spaces, e. g., the trephine, La grange, Herbert, Holth, Critchett-Borthen operations, etc. The Fergus operation is a combination of the trephine and cyclodialysis procedures, unfortunately but little known in this country. The second division may be subdivided into the pure decompression operation e. g., the trephine, La grange and Herbert operations that depend almost wholly on the removal of a section of tissue to establish this drainage and those that interpose a tissue or a foreign substance between the lips of the wound to maintain this drainage as in the iridotasis and Zorab-Mayou operations.

In the first group we attempt to reopen the drainage angle that leads to the canal of Schlemm. This meshwork we know normally consists of soft trabecular tissues that originate from the tissues existing there, that is, the cornea, sclera and iris. The peripheral iris synechia that are usually present are however central to the meshwork. We know from clinical experience that pupillary iris synechia are difficult to break up, even surgically, if they have existed for a long time. We also know if we successfully separate them in a congested or recently inflamed eye that they tend to reform. In the pupillary area the space present permits the iris borders a freedom for movement that does not exist in the drainage angle, so that one may conclude that conceding our ability to free the peripheral iris synechia in a chronically congested case of glaucoma that these synechia would be very likely to reform. But for the sake of argument let us concede that these synechia have been successfully separated and prevented from reforming by the use of eserine, but the meshwork of the drainage angle still remains to be dealt with before the fluids can enter the canal of Schlemm. This meshwrok is a delicate fibrillar structure lined by endothelium and whether we accept this structure as a permeable membrane separating the anterior chamber from the canal of Schlemm or not is immaterial. Its status in the pathologic state is quite charactertistic, namely, crowded against the cornea-sclera by the intraocular pressure so that its original architecture is barely perceptible. The ability to separate these tissues successfully is very doubtful, but conceding that we do so, we have separated connective tissue adhesions that must reform unless the tissues so separated can be kept apart long enough until endothelial proliferation has taken place. We know from clinical experience how difficult this is, even in so crude a state as in burns of the conjunctiva where the tissues are under direct observation and manipulation. Therefore one may conclude that such an accomplishment is very difficult and probably very doubtful of attainment.

But for the sake of further elaboration of our argument let us concede that a favorable result has been attained. All such operations are performed in the region of 12 o'clock with exception of the cyclodialysis of Heine which is a very difficult technique to apply to this area. What proof or information have we that such synechia exist at this particular point and if such synechia do not exist here is it not very likely that we will produce them by our surgical manipulation.

We may therefore conclude that all operations devised for the purpose of reopening the normal avenues of fluid escape in the region of 12 o'clock are attended with some danger and of doubtful ability to accomplish the desired objective, regardless of the fact that the abnormal intraocular pressure may be influenced favorably.

In the next class we have the decompression operations in which the fluid escape is diverted to the subconjunctival spaces. This is accomplished by the removal of a section of tissue in the region of the limbus and it is really a matter of no great import whether you remove a round section as in the Elliott or Fergus trephine operation or an elliptical section as in the La grange procedure or a wedge-shape section as in the Herbert operation. The resultant aim is the establishment of a fistulous tract leading to the subconjunctival spaces. The ability to maintain this fistulous tract was thought to depend largely on the size of the section removed and the favorable healing that would permit of a continuous seepage. Thus punches were devised and separated incisions made to favor such healing. The com-

parative abandonment of the La grange technique was in a measure due to the very soft eye resulting and was followed by many modifications under different names. All of these procedures were and are based on this same mechanism, the idea in mind being to obviate this very soft eye, but to maintain the fistulous tract that permitted seepage. This has been more or less successful, the great difficulty being just how large a section was to be removed and how much of this removed section would remain open and how much would be replaced by connective tissue. We must concede that if we cut out a section of tissue, this cut must heal and as far as we know today, such healing always takes place by the production of connective tissue. We further know, that a tissue that has been subjected to repeated congestion or inflammation does not heal as favorably as one not the seat of such pathology, by that I mean, a greater tissue reaction is always associated with a greater connective tissue proliferation and subsequent contraction which tends to defeat the primary objective.

In the operations devised with the same objective in view, but without the removal of a tissue section, the maintenance of the fistulous tract is dependent on the interposition of a tissue or foreign body between the lips of the wound. The first operation so devised was in 1857 by Critchett, but better known as the iridotasis operation of Borthen. Many others have been devised with the same idea in mind as in the Zorab-Mayou seton operation where a foreign body was used in place of the iris. Recently the Holth iridencleisis operation has been so modified that it no longer differs in its essential features from the iridotasis operation. Even with the interposition of iris tissue, failure will follow in a certain percentage of cases, due to factors that favor connective tissue production. If in the formation of the conjunctival flap the tissues have been unduly traumatized, connective tissue adhesion between the subconjunctival tissues and the sclera will take place; a thin or semiatrophic iris will tend to permit the lips of the limbal wound to close and thus in both cases defeat its purpose.

The implantation of a foreign body between the lips of the wound for the purpose of acting as a seton has I believe been almost abandoned owing to the many disappointments.

CONCLUSIONS

1. Therefore one may conclude that operations that have for their objective the reopening of the natural avenues of fluid escape fail to do so, but may reduce the intraocular pressure by other means, probably by the unintentional interposition of iris tissue in the limbal wound.

2. The decompression operations where a section of tissue is removed at the limbus, tend to close unless the section is large or iris tissue prolapses into the wound leaving a fistulous tract.

3. The operations limited to an incision at the limbus with the interposition of iris tissue would appear to be the most positive method for the establishment and maintenance of a fistulous tract.

DISCUSSION

Dr. Harry Woodruff, Joliet: Dr. Goldenburg has mentioned the gonioscope. I have had no personal experience with it; but if it is a practical instrument it would be of great value in glaucoma. Some of the pictures Dr. Goldenburg has shown are I believe gonioscopic views taken by Reese, of New York.

An important point which was brougth out was that the use of eserine, its effect was of prognostic importance. If eserine reduces the tension to normal, then there are no marked adhesions of the iris to the cornea in any part. Therefore operation has the best chance of permanent reduction of tension. Of course these are just the kind of cases that the average ophthalmologist would be inclined to continue under eserine.

A number of years ago I became very much interested in an operation, an improved iridectomy brought out by Török of New York, in which he attempted to show how the effects of iridectomy could be much increased. The operation, besides the iridectomy, embraced the additional procedure of cyclodialysis, or iridocyclodialysis, depending upon how brave you were when you had a spatula in your hand and were separating the uveal tissue from the cornea-sclera. I will confess that after having some hemorrhages, I weakened in the extent to which I performed the dialysis, and in those cases in which the separation was not performed, reduction in tension was less apt to be successful. I have a few slides, and perhaps by them I will be able to emphasize the points I wish to make. This represents the normal iris angle, the space called the chamberbay, and as near as I have been able to find out it is ¼ mm. normally from the iris surface to the corneal surface in the location of the canal of Schlemm. Here is one similar to the one Dr. Goldenburg showed, in which there is no longer any angle. It is obliterated by the iris tissue lying against the corneal tissue. If you have a case in which that condition is brought out, here again your gonioscope might be of value in determining the condition through the circumference of the eye; it would be very difficult, as Dr. Goldenburg

brought out, to separate this tissue down to the normal angle. This specimen, which was used in the paper, was from the Illinois Eye and Ear Infirmary. It shows very definitely why the iridectomy could not and did not relieve the condition. Here is the scar of the corneal incision; here is the canal of Schlemm; here the iris was cut off. Of course the operator could not get the iris that lay beneath the overhanging cornea and sclera, and a considerable amount of iris tissue still blocked the angle. This is a schematic drawing showing possible lines of incision. I tried to show that the incision could be made in the angle and sufficiently far back. These two lines would indicate where—this is the usual point at which incision is made.

I became sufficiently interested in the subject to try experimentally if it was possible in a normal eye to remove that obstruction. This is a kitten's eye in which I succeeded in getting the incision back beyond the angle. I am back that far—further than necessary in order to get the iris. It shows that it is possible to get back far enough, experimentally at least. This is a kitten's eye in which the incision was made exactly flush with the ciliary body; the iris is removed. So I proved to my own satisfaction that the iris could be removed in the normal eye up to its attachment to the ciliary body. I also satisfied myself that it was not necessary to do a complete iridectomy.

This is a sketch of a glaucoma patient upon whom twenty years before I had performed an iridectomy successfully. She returned after all those years with a return of tension. Here you see what mutilation it would be to do another complete iridectomy. I contended myself by doing a deep iridectomy but only removing a portion of the iris root. The tension was reduced to normal and continued so while she was under observation. Here is one of the disastrous effects of operation on the globe. It is less apt to follow an iridotasis operation, and I made that observation in an article in which I discussed hemorrhage. Here is a specimen of choroidal hemorrhage. Elliott claims that he never saw in intraocular hemorrhage in a trephining operation. There is one. This is the lens in the anterior chamber. That condition may occur in any operation, or without any. Glaucoma is a disease that predisposes to hemorrhage.

The principal point that I would make here is that the chances for the eye are greater the earlier the operation. I believe this is especially true in glaucoma, before we have the iris up against the cornea. Of course if you have that you do not know how extensive it is and your chances in an iridectomy are slight indeed. They are much better with iridotasis though not good.

Here is where the serious thing comes in. You use eserine and reduce the tension and you say all is well, we are going to continue to use eserine. You may do it for years. But for the case that goes well for years under eserine, there are many, many others that do not, and if not operated on early they are failures. I still believe that glaucoma is a surgical disease. To compromise with the patient do a deep iridectomy on the one eye, providing it is early. I say that the good results are due to the fact that you get the patient early. In acute glaucoma the patient comes at once because of pain. You operate early and you get it before you have the structural change, you still have an anterior chamber and can remove the iris clear up to its root. I have a further observation to make regarding this operation of iridotasis. I have had several cases in which the tension was not reduced to normal limits by iridectomy, and was reduced by the iridotasis. I think however these were cases in which there were adhesions of iris to the cornea.

Dr. O. B. Nugent, Chicago: There are two things I want to mention, along with what Dr. Woodruff has been saying about getting to the root of the iris. in doing an iridectomy. The use of the keratome in my hands is not sufficient to cut down to the root of the iris. I prefer a cataract knife, making a puncture, allowing the point of the knife to go into the anterior chamber and follow the anterior surface of the iris as far as possible. Then the knife will come to the iris angle. I would like to refresh your memory about my statistics that I have made on 2,200 cataract operations in which hemorrhage seemed to follow along with cases that had increased intraocular tension. As you know, Elschnig makes quite a point of high blood pressure as an etiologic factor in choroidal hemorrhage but in my cases I have found that the thing that predisposes to choroidal hemorrhage is intraocular hypertension. Perhaps along this line we should look for more hemorrhage following the operations in cases of glaucoma. We do not because there is not so much damage done to the eye.

Dr. Michael Goldenburg, Chicago (closing): I want to thank Dr. Woodruff for his discussion, and I am pleased that he agrees with me. I visited with Troncoso in New York some years ago and he demonstrated the gonioscope to me. It is a cumbersome instrument to handle and very difficult to use, I should say, in an inflamed eye. In the noncongestive type it would permit of easier manipulation. It should be a valuable instrument, but it has never attained the popularity which it seems entitled to.

I believe with Dr. Woodruff, that the favorable results obtained from an iridectomy operation are due to the proliferation of iris pigment or prolapse of iris tissue into the wound which permits of filtration. It would appear from the slides I have shown that these points are well demonstrated and that at times even ciliary processes may also be prolapsed into the wound. Thus during these operations we may not only cut off iris tissue, but at times even the ciliary process and even the ciliary body, which eventually leads to phthisis bulbi. I prefer the iridotasis operation as you all know because it is more definite and more simple, but we sometimes have failures even in that procedure.

Relative to choroidal hemorrhage mentioned by Dr. Nugent and Dr. Woodruff. A serious choroidal hemorrhage may take place in any intraocular operation where the increased intraocular pressure has existed over a long period. Sudden relief of this pressure by

entering the anterior chamber immediately removes the protective force of the friable capillaries and they explode. We know we remove the extracapillary pressure when we open the anterior chamber in any procedure; the same thing must take place in glaucoma. In glaucoma that has existed over a long period the capillaries are usually sclerosed and friable. On the whole, glaucoma is still a very serious problem and still far from being solved. In the non-congestive type of glaucoma where we try to avoid operation, there is some excellent work being done at the pressent time.

VALUE OF FRIEDMAN MODIFICATION OF ASCHHEIM-ZONDEK TEST

JOSIAH J. MOORE, M.D., says:

The Friedman test is a modification of the Aschheim-Zondek test for pregnancy wherein young, nonpregnant adult, female rabbits which have been isolated from male rabbits for at least three weeks are employed in place of young female mice. The rabbits are injected intravenously with 10 cc. of urine (fresh morning specimen) and the ovaries examined grossly after forty-eight hours.

In a recent review of 4,595 Friedman tests in uterine pregnancy, performed by thirty-two clinical pathologists, 97.19 per cent of the tests were correct. Of the 2.83 per cent erroneous results, 0.52 were false positives and 2.31 were false negatives. The most common cause of false negative results was testing the urine before the woman had been pregnant long enough for the result to be positive. However, any laboratory procedure which gives results with an accuracy of over 97 per cent must be considered extremely satisfactory. The test was found to be correct in 77.8 per cent of the cases of ectopic pregnancy. Its diagnostic value is greatest in cases in which the result is positive. A negative test does not exclude an ectopic gestation.

The Friedman test is not a means of determining the death of the fetus. Since a positive test means that living chorion is in contact with the maternal circulation, stimulating the production of the anterior pituitary hormone prolan A, which is found in the blood serum and excreted through the urine, a negative test in either ectopic or uterine pregnancy would indicate dead or degenerating villi with or without a live fetus. The test is positive in cases of mole and chorionepithelioma, in which no fetus is present; also in some tumors of the testis.

Ravenswood Hospital Medical Library Bulletin No. 2, 1934-35.

It has been positive for as long as thirty days after the death of a fetus in missed abortion.

This test has been found positive as early as ten days after coitus. It usually is positive shortly after the first missed menstrual period. It becomes negative within 24 to 72 hours postpartum.

The most desirable specimen is the first urine passed in the morning, and it should be taken at a time when the patient is not under medication. Catheterization is not necessary, but cleanliness of the specimen and container is essential. The taking of drugs such as ergot, quinine, luminal, morphine, codeine, or aspirin, affects the animals used for the test, some drugs producing fatal results.

Goldberger and his coworkers have increased the percentage of accuracy by employing two rabbits and injecting 20 cc. of urine into each, so that in over one thousand cases the percentage of false positives was 0.09 and of false negatives 0.55, giving an accuracy of over 99 per cent.

While the Friedman test, like other laboratory procedures, has its limitations, it is the most valuable laboratory aid of the clinician in determining pregnancy. It is useful in determining early pregnancy in cases in which early interference may be necessary, as in diabetes, tuberculosis, renal or cardiac disease; in cases where differential diagnosis between normal pregnancy, ectopic gestation, toxemia of pregnancy, or chorionic tumors and other acute or chronic abdominal conditions is necessary; where differential diagnosis between uterine tumors and pregnancy is required; and in testing the completeness of removal of the products of gestation, hydatid mole, or malignant tumors originating from chorionic villi. Finally, it is of value in the diagnosis of testicular tumors and their recurrence.

HONEY PRODUCES ENERGY RAPIDLY

If you want quick energy, eat honey. So advises the Department of Agriculture in explaining the food value of this bee product.

Not only is honey sweet to the taste but it can be absorbed almost immediately into the blood stream to provide energy without any tax on the digestive system.

Most foods must be digested or broken down into simpler substances before they can be utilized as fuel by the body, but this is not true of honey. It is composed of two simple sugars, dextrose and levulose, which can be absorbed directly into the blood stream without any difficult digestive process.

This fact explains why honey is a desirable sweetening in foods for infants, invalids and aged persons.

INTESTINAL TUBERCULOSIS: PATHOLOGIC AND ROENTGENOLOGIC OBSERVATIONS

Russell S. Boles and Jacob Gershon-Cohen, Philadelphia (*Journal A. M. A.*, Dec. 15, 1934), analyzed 1,000 consecutive necropsies at the Philadelphia General Hospital to show the incidence of intestinal tuberculosis and its relation to pulmonary tuberculosis. Ulcerative intestinal tuberculosis was shown to have its highest incidence in cases of fibro-ulcerative cavernous pulmonary tuberculosis. It was so confined to this group that one might suspect that there is no intestinal ulceration without pulmonary ulceration. It was shown to occur in cases of early or exudative pulmonary tuberculosis, in which, however, it had its lowest incidence (18 per cent). It occurred more frequently in women of the Negro race between 20 and 40 years of age. It was

not observed in any case of chronic fibroid or miliary tuberculosis. Primary hyperplastic tuberculosis or tuberculoma of the intestine was not observed in any case. Such non-tuberculous intestinal lesions as carcinoma, peptic ulcer, appendicitis and diverticulitis, all with and without perforation, were associated with pulmonary tuberculosis. Cardiovascular-renal disease, chronic cholecystitis, cholelithiasis and cirrhosis of the liver were commonly noted diseases associated with pulmonary tuberculosis with and without intestinal ulceration. In view of the uncertainty of the symptoms and physical signs of intestinal tuberculosis, the authors believe that a strong inferential diagnosis of the disease can be made when one considers it in its relation to the various types of pulmonary tuberculosis and as a result of evidence secured by the double contrast barium enema.

FREAK FRACTURE

"How did you break your leg?"

"I threw a cigarette into a man hole and stepped on it."—*Colgate Banter.*

Society Proceedings

COOK COUNTY

CHICAGO MEDICAL SOCIETY

Regular Meeting, Wednesday, December 5, 1934

LAY EDUCATIONAL PROGRAM—CANCER IS CURABLE

The Story of Cancer (Illustrated)—Wm. A. O'Brien, Associate Professor of Pathology, University of Minnesota.

Cancer Charlatans—Morris Fishbein, Editor, Journal American Medical Association.

Regular Meeting, Wednesday, December 12, 1934

ACUTE CORONARY THROMBOSIS

Pathology—Laurence E. Hines, Assistant Professor of Medicine, Northwestern University Medical School.

Symptoms and Diagnosis of Coronary Occlusion—James G. Carr, Professor of Medicine, Northwestern University Medical School.

The Aftermath of Coronary Thrombosis—Chauncey C. Maher, Assistant Professor of Medicine, Northwestern University Medical School.

Preventive Therapy—Don C. Sutton, Associate Professor of Medicine, Northwestern University Medical School.

Medical Therapy—Sidney Strauss, Professor of Clinical Medicine, University of Illinois.

Discussion—James B. Herrick, Wm. A. Brams, Edward D. Hollingsworth, Italo F. Volini, Robert W. Keeton, N. S. Davis.

Regular Meeting, Wednesday, December 19, 1934

FRACTURE NIGHT

Fractures and Other Injuries of the Hip—Frederic J. Cotton, Boston, Mass.

Discussion—Philip Kreuscher, William Cubbins, Kellogg Speed, Beveridge Moore, Paul Magnuson, Edwin M. Miller, Edwin W. Ryerson.

GREENE COUNTY

The regular meeting of the Greene County Medical Society was held in Roodhouse, Friday evening, December 6, 1934.

After a chicken pie dinner the meeting was called to order in the parlor of the Oak Cafe, by the President, Dr. E. E. Jouett.

Dr. T. B. Knox of Quincy, Councilor of the sixth district was introduced and gave an interesting and instructive talk on the relationship of the Medical Profession to Relief Work, and pointed out some of the dangers to the public, of Socialized, or so-called State Medicine.

The public has suffered, and is now suffering, because of State Medicine in some of the European countries, e. g. Germany and England. If the American public is wise and alert to the welfare of the home it will oppose any effort to socialize the practice of medicine.

Dr. J. Curtis Lyter of St. Louis was next introduced and gave a very scientific and instructive lecture on the "Angina Pectoria of Effort, Its Diagnosis and Treatment." Dr. Lyter spoke for two hours, using lantern slides to illustrate some portions of his work. Our members and visitors, of whom we had quite a number from Jacksonville, Quincy and Jerseyville, listened with unabated interest to the lecture and to the discussion that followed.

After the scientific session was concluded a business session followed and the following officers were elected for the year of 1935: president succeeding Dr. E. E. Jouett, Dr. A. D. Wilson; vice-president succeeding Dr. Wilson, Dr. A. K. Baldwin; secretary succeeding himself, Dr. W. H. Garrison; censor succeeding Dr. Baldwin, Dr. F. N. McLaren.

The President appointed the following committee to co-operate with our County Relief workers and to represent the County Medical Society in all matters pertaining to the Relief Work.

Dr. W. H. Garrison of White Hall, Chairman; Dr. H. W. Smith of Roodhouse; Dr. A. R. Jarman of White Hall; Dr. A. K. Baldwin of Carrollton; Dr. C. O. Bulger of Greenfield.

The next meeting will be held in Carrollton, March 8, 1935.

W. H. Garrison, Sec'y.

RANDOLPH COUNTY

Twenty-three sat down to an enjoyable meal served to them at the 2nd monthly Randolph County Medical Society meeting, November 15, at the Hotel Bates, Sparta. The doctors and their wives were glad to have with them, as guests, Dr. Harold Swanberg of Quincy, guest speaker for the men; Mrs. Foulon, Auxiliary Councilor for the 10th district from E. St. Louis, the auxiliary's guest for the evening and Mrs. Gross, District Health Nurse.

After the dinner all adjourned to the lecture room

to hear a constructive slide talk and lecture given by Dr. Harold Swanberg on "Radium Therapy in the treatment of Uterine Hemorrhage."

Later the women listened to an interesting talk on Auxiliary affairs by Mrs. Foulon. The successful evening was due to the courtesy and active participation of Drs. Boynton and Robeson of Sparta. The next meeting is to be at Red Bud.

E. RALPH MAY, M. D., Sec'y.

Marriages

JAMES B. GILLESPIE, Urbana, Ill., to Miss Ruth H. Brown of Norwich, N. Y., November 10.

OSCAR J. MICHAEL, Danville, Ill., to Miss Pauline S. Smith of Brigden, Ont., Canada, October 20.

CLARENCE OLSON, Princeton, Ill., to Miss Ola Mae Dilts of Michigan City, Ind., in Chicago, November 1.

LESLIE H. REIMERS, Chicago, to Miss Margy Ebaugh of Akron, recently.

ESTHER ELIZABETH SMUCKER, Morton, Ill., to Mr. John Hodel at Tiskilwa, Ill., November 4.

SIDNEY WILLIAM WATSON, Alexis, Ill., to Miss Margaret Powers of St. Paul, at Bowlers, Minn., November 3.

FRANK E. WHITACRE, Chicago, to Miss Lillian Myers of Sylvania, Ohio, November 21.

Personals

Dr. David J. Davis has been made president of the Institute of Medicine of Chicago, succeeding Dr. Joseph L. Miller.

Dr. Oliver S. Ormsby, Chicago, discussed "Mycotic Infections" before the Peoria City Medical Society in Peoria, December 4.

Dr. Jack D. Kirshbaum, among others, addressed the Chicago Pathological Society, December 10, on "Sarcomas of the Diaphragm."

Dr. James R. Nakada, St. Louis, addressed the Belleville meeting of the St. Clair County Medical Society, December 5, on tularemia.

Dr. David J. Davis, Chicago, addressed the Kankakee County Medical Society, December 13, on "Relationship of the State University School of Medicine to the Medical Profession."

Speakers before the Chicago Society of Allergy, December 17, were Drs. Meyer R. Lichtenstein on "The Patch Test for Gold Hypersensitivity" and Ben Z. Rappaport, "Cartridge Method for Intracutaneous Tests."

At a meeting of the Chicago Tuberculosis Society, December 13, Drs. Elven J. Berkheiser spoke on "Bone and Joint Tuberculosis"; Meyer R. Lichtenstein, "Immunity in Tuberculosis," and Leo L. J. Hardt, "Gastro-Intestinal Tuberculosis."

Dr. Leon Unger addressed the Southern Medical Association at San Francisco, Texas, on November 13. The subject "The Treatment of Bronchial Asthma."

Dr. Geza de Takats addressed the Kansas City Academy of Medicine on December 21. His subject was, "Surgery in Diabetes."

Dr. Philip A. Halper addressed the Sight-Saving Class Teachers of Chicago, December 8, on "Problems Pertaining to Sight-Saving Classes and Prevention of Blindness."

Dr. J. P. Greenhill read a paper on "Recent Advances in Obstetrics and Gynecology," November 20, before the Ingham County Medical Society, at Lansing, Mich.

Dr. Frederic J. Cotton, Boston, conducted an operative clinic at Cook County Hospital, December 20.

Speakers before the Chicago Surgical Society, December 14, included Dr. Alexander B. Ragins, who presented a clinical report of "Strangulated Hernia Simulating Appendicitis."

Dr. Irving H. Neece, Decatur, among others, addressed the La Salle County Medical Society in Streator, November 22, on "Importance of Hematuria in Diagnosis."

Dr. Francis A. Dulak has been appointed a member of the Chicago Board of Health, succeeding Dr. Edward F. Dombrowski.

Dr. John E. Gorrell, for the past two and one-half years assistant to the superintendent of the University of Chicago Clinics, resigned recently to become superintendent of the Falk Clinic at the University of Pittsburgh.

The Chicago Ophthalmological Society was addressed, December 17, among others, by Drs. Carl O. Schneider on "Use of Prosthesis Over Un-

sightly Eyes" and Harry S. Gradle, "Prevention of Blindness."

Dr. M. E. Rudolph was elected president of the Aurora Medical Society for the coming year. Dr. F. F. Garrison was chosen vice-president and Dr. R. V. Turner was re-elected to serve another term as secretary-treasurer.

Dr. Thomas A. Carter gave a health lecture at Central Y. M. C. A., December 7.

Dr. Philip H. Kreuscher was the guest of honor at a joint meeting of the Vermilion County Medical Society and the Tuberculosis Association, December 4.

Dr. A. F. Lash addressed the Scott County Medical Society at Davenport, Iowa, December 4.

Dr. George W. Hall addressed the Will-Grundy County Medical Society meeting, December 5.

Drs. A. H. Parmelee, Clifford G. Grulee and S. C. Peacock presented a pediatrics program at DuQuoin on December 6 sponsored by the Ninth and Tenth Councilor Districts of the Illinois State Medical Society.

Drs. E. S. Hamilton of Kankakee and R. K. Packard presented a program on "Medical Economics" and "Medical Relief" before Livingston County Medical Society at Pontiac, December 6.

Dr. R. W. McNealy addressed the Rock Island County Medical Society, December 11.

Dr. David S. Hillis addressed the Will-Grundy County Medical Society, December 12.

Dr. Herman L. Kretschmer read a paper before the Allen County Medical Society at Fort Wayne, Ind., December 4 on "The Relationship of Urologic Diagnosis to General Diagnosis."

News Notes

—Dr. Frederick J. Gaenslen, professor of orthopedic surgery, University of Wisconsin Medical School, Madison, addressed the Chicago Orthopedic Club, December 14, on "Fractures of the Neck of the Femur: Experimental and Clinical Studies."

—Speakers before the Chicago Gynecological Society, December 21, Drs. Philip H. Smith on "Hemorrhage in Late Pregnancy"; David S. Hillis, "Diagnosis and Treatment of Late Hemorrhages in Pregnancy," and William J. Dieckmann and Edwin F. Daily on "Role of Blood Transfusion in Treatment of Obstetric Hemorrhage."

—A bronze tablet has been placed in the Country Home for Convalescent Crippled Children as a memorial to Dr. Frank Billings and bearing the inscription: "In Memory of Dr. Frank Billings 1854-1932, the great physician whose wise counsel and unfailing encouragement were an enduring benefaction to this home." The tablet is the gift of the home.

—Speakers before the Chicago Society of Internal Medicine, November 26, were Drs. Rudolph Schindler on "Gastroscopy—Present Status and Value in Diagnosis of Gastric Disease"; James G. Carr, "Clinical Experiences with a Derivative of Squill," and Joseph L. Miller, "Recent Advances in Our Knowledge of the Thyroid Gland."

—At a meeting of the Chicago Laryngological and Otological Society, December 3, Dr. John Gordon Wilson presented "A New Approach to the Study of Otosclerosis"; Austin A. Hayden, "Otologists and Leagues for the Hard of Hearing," and Miss Gertrude Torrey, "Application of Lip Reading to Cases of Progressive Deafness."

—The Chicago Woman's Club through the Cancer Research Committee announces a series of talks on "Cancer—Its Cause—Its Treatment —Its Cure," at the Chicago Woman's Club, 72 East Eleventh Street, Thursdays in January from 11 to 12 a. m.

James P. Simonds will give the first talk of the series on "What Is Cancer? Its Biology and Pathology. Its Cause."

—The Central Neuropsychiatric Hospital Association recently held its annual meeting in Cincinnati with the Central Neuropsychiatric Association. This organization is composed of twenty-eight of the leading sanitaria of the middle states. A special meeting will be held in Chicago, January 25, 1935, at which papers will be presented dealing with private hospital problems and related medical subjects.

—Mr. John B. Zingrone, roentenologist of Mercy Hospital for twenty-two years, was awarded the Cross of Chevalier of the Order of the Crown of Italy at a banquet in his honor, December 6. Speakers included Mayor Edward J. Kelly, Dr. Philip H. Kreuscher, past president of the state medical society, and Dr. Julius H.

Hess, president elect of the Chicago Medical Society.

—The University of Illinois College of Medicine presented a program December 7, when the biologic faculty from the university at Urbana visited the school. Speakers included the following:

Richard L. Webb, Ph.D., Mesenteric Lymphatics.

Dr. Lars F. Gulbrandsen, Passage of Bacteria Through Intestinal Wall.

Dr. William F. Petersen, Biologic Reflections of Meteorological Variability.

Dr. Eric Oldberg, The Contribution of Neural Surgery to Medicine.

Dr. Ernst Gelhorn, The Influence of the Oxygen and Carbon Dioxide Tensions of the Inspired Air on Sensory Processes.

Dr. Robert W. Keeton, Studies in Obesity.

Deaths

Merwyn R. Bibb, Chicago; Harvey Medical College, Chicago, 1902; aged 58; died, October 24, of chronic nephritis and secondary anemia.

William Scott Campbell, Chicago; Rush Medical College, Chicago, 1885; member of the Illinois State Medical Society; past president of the Tippecanoe County (Ind.) Medical Society; for many years health commissioner of Tippecanoe County, Ind.; aged 77; died suddenly, November 3, at his home in Oak Park, Ill., of angina pectoris.

James A. Clark, Chicago; Chicago Medical College, 1885; a Fellow, A. M. A.; aged 73; formerly on the staff of St. Anthony's Hospital; on the staff of the West Side Hospital, where he died, September 29, of uremia, following a prostatectomy.

Albert Joseph Croft, Chicago; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1906; aged 56; died, October 31.

William Ralph Eddleman, Anna, Ill.; University of Tennessee College of Medicine, Memphis, 1912; aged 46; died, October 17, as the result of injuries received in an automobile accident and of cirrhosis of the liver.

Ephraim Melvin Folsom, Mount Vernon, Ill.; Barnes Medical College, St. Louis, 1896; served during the World War; aged 64; died suddenly, November 7, of heart disease.

Samuel L. Friduss, Chicago; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1897; a Fellow, A. M. A.; on the staff of the Englewood Hospital; aged 64; died, November 10, of carcinoma of the bladder.

Philip F. Gillette, Kankakee, Ill.; Northwestern University Medical School, Chicago, 1896; aged 64; formerly on the staff of the Elgin (Ill.) State Hospital; on the staff of the Kankakee State Hospital, where he died, October 27, of cerebral hemorrhage.

David P. Hueston, Jacksonville, Ill.; College of Physicians and Surgeons of Chicago, 1888; aged 84; died, October 31, as the result of injuries received in a fall.

William C. Nordholz, Oak Park, Ill.; Jenner Medical College, Chicago, 1911; a Fellow, A. M. A.; served with the American Red Cross during the World War; on the staff of the Garfield Park Hospital; aged 49; died, December 7, of coronary thrombosis.

F. C. William Obert, East Alton, Ill.; American Medical College, St. Louis, 1890; aged 71; died, October 16, of arteriosclerosis.

Gifford Osborne, Brownsville, Texas; Rush Medical College, Chicago, 1895; a Fellow of the American Medical Association; member of Chicago and Illinois Medical Societies; On staff of Chicago Policlinic, Henrotin, Illinois Medical and Chicago General Hospitals; aged 61; died, September 24, of coronary sclerosis.

Augustus E. Perlewitz, Chicago; Hering Medical College, Chicago, 1907; aged 77; died, October 22, of cerebral hemorrhage and arteriosclerosis.

Grant Porter, Plainfield, Ill.; St. Louis College of Physicians and Surgeons, 1896; a Fellow, A. M. A.; aged 62; died, October 20, of carcinoma of the larynx.

Charles Schmidli, Bonfield, Ill.; Reliance Medical College, Chicago, 1910; member of the Illinois State Medical Society; aged 63; died, October 19, in St. Mary's Hospital, Kankakee, of intestinal obstruction.

Frank Elbert Smith, Decatur, Ill.; Chicago College of Medicine and Surgery, 1913; a Fellow, A. M. A.; fellow of the American College of Surgeons; chief surgeon to the Wabash Hospital; aged 51; died, November 7, of lethargic encephalitis.

William S. Strode, Lewiston, Ill.; Rush Medical College, Chicago, 1884; formerly member of the board of health; Civil War veteran; past president of the school board; aged 86; died, November 5, near Tucson, Ariz., of cerebral hemorrhage.

Leroy Thompson, Chicago; Hahnemann Medical College and Hospital, Chicago, 1908; Fellow of the American College of Surgeons; consulting oculist and aurist of the Illinois Bell Telephone Company and chief consultant in ophthalmology and otology of the Illinois State Industrial Commission; on the staffs of St. Luke's and the Illinois Masonic hospitals; formerly chief of the staff of the Illinois Eye and Ear Infirmary; aged 51; died, November 14, in Bath, N. Y., of carcinoma.

William I. Timmer, Cicero, Ill.; Chicago College of Medicine and Surgery, 1911; member of the Illinois State Medical Society; on the staff of the West Suburban Hospital; aged 54; died, November 14, of heart disease.

Frank Wieland, Chicago; Hering Medical College, Chicago, 1896; a Fellow, A. M. A.; formerly professor of genito-urinary diseases, Hahnemann Medical College and Hospital; on the staff of the Henrotin Hospital; aged 65; died suddenly, November 18, of myocarditis and cerebral embolism.

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